CCOS '79

Meeting The Challenge Of The 80's

JULY 1979

CATJ

OFFICIAL JOURNAL OF THE COMMUNITY ANTENNA TELEVISION ASSOCIATION

Oak stages a seminar in print. Session 1...

Six steps to becoming a converter expert.

New Econo-Line Thirty shown

Step 1. Evaluate your present and future needs. Will the converter you select accommodate your present channel needs and will it handle expected future channel expansion? The "right converter" should still be the right converter five to ten years from now.

Step 2. Compare systems—Block converter or conventional converter? A low-cost block converter shifts a block of CATV channels to a corresponding block of VHF channels. This approach may work where a handful of additional channels are needed, but is not recommended for use in a strong signal area. *For optimum performance, a block converter should never shift channels to UHF,* as many subscribers have sets with non-detented or poor UHF tuners. A conventional or channel-by-channel converter offers a knob or series of buttons to allow your subscribers direct-channel selection without touching the channel knob on their TV set. Though more costly, this converter is best suited for most systems. In the long run, channel-by-channel converters reduce complaints of interference and tuning difficulty.

Step 3. Compare companies. Is the company selling the converter the same company that designed and built it? CATV converters are precision devices that must be closely monitored for quality at *every* stage from drawing board to final testing.

Step 4. Compare warranties. How strong is the warranty being offered? Are you being offered the same warranty as other buyers? Check the length of coverage, what services it includes and what service turnaround time is promised. Don't accept unwritten promises.

Step 5. Compare quality... then price. Only after all of the above considerations have been carefully evaluated can you begin to compare price. A low-cost converter is the "right buy" *only* if it meets the needs of your system.

Step 6. Call Oak. We'll send you literature on the complete line of Oak channel-by-channel and block converters, as well as other tips on how to select the best converter for *your* system. We'll also prove to you that Oak protects your system from lost revenue better than any other manufacturer. For your information packet, call our Locator Operator toll free at 800-323-6556 (in Illinois 800-942-6345) and ask for the CATV information desk.

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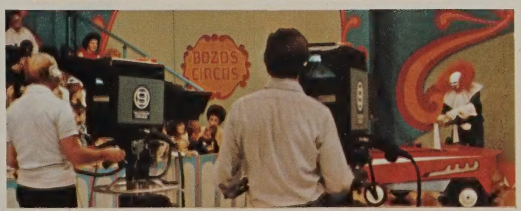

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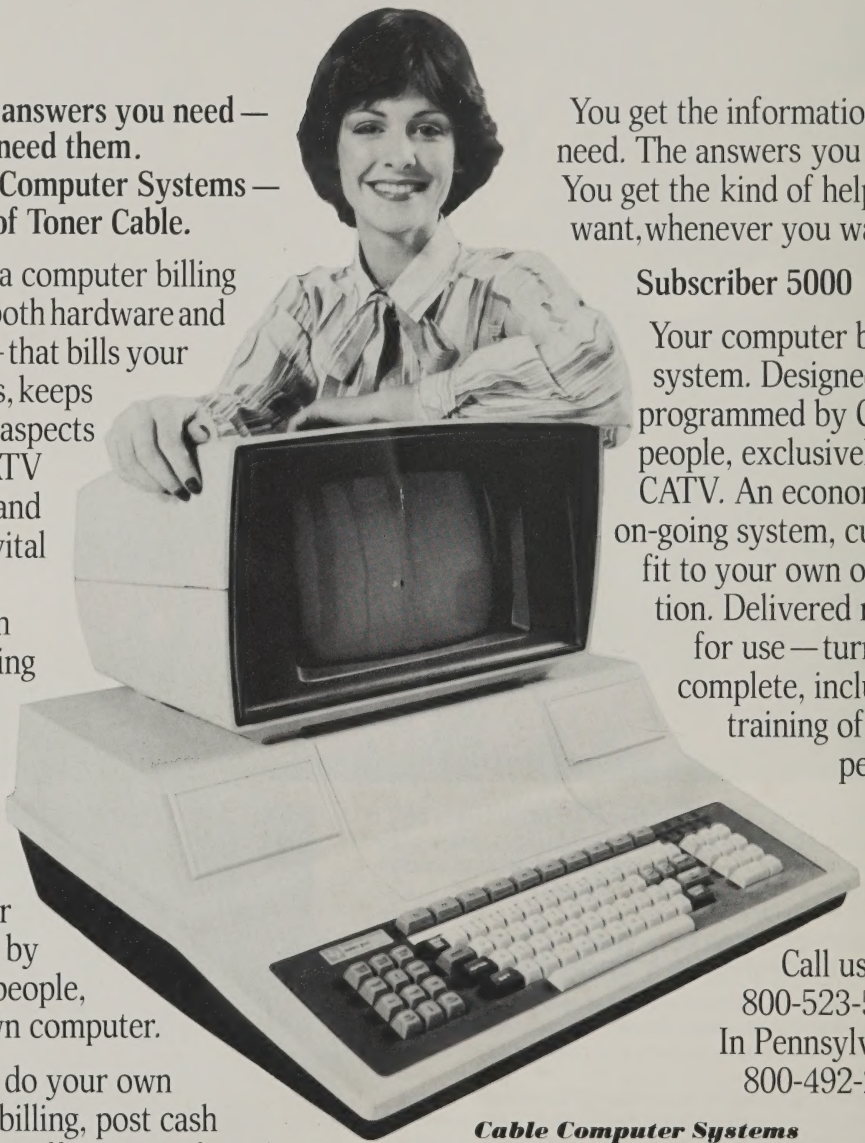

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CATJ

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OFFICES
CATA/CATJ
4209 N.W. 23rd, Suite 106
Oklahoma City, Oklahoma 73107
(405) 947-7664
CATA (Washington Office)
Steve Effros, Executive Director
1100 17th St. NW(Suite 506)
Washington, D.C. 20036
(202) 659-2612

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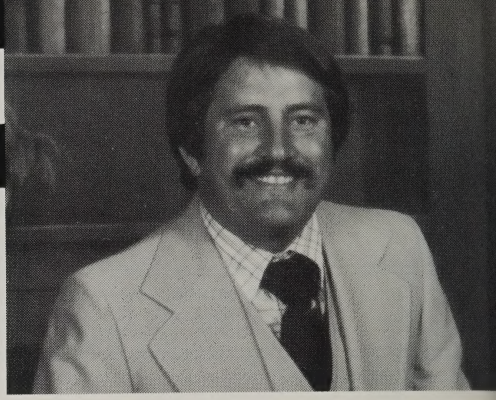
—FEATURES—

—DEPARTMENTS—

OUR COVER

For our CCOS-79 special edition, we asked our Production Manager and Artist Extraordinaire, Debbie Teel, to design something that would be indicative of the concept and theme of this year's seminar, and we think she did an excellent job. We liked it so much that we adopted it as the original logo for CCOS-79; we want to take this opportunity to thank her for her originality and understanding as she conveyed our philosophies into this drawing.

CATA-TORIAL



BEN CAMPBELL, President of CATA, Inc.

CCOS '79 — A TIME TO VISIT WITH OLD FRIENDS AND MAKE NEW PLANS

It's "meeting time" again. This year the Community Antenna Television Association will have its biggest meeting ever, and I trust that it will be just as successful as the last few in not feeling like a big meeting. Some other folks call their annual meetings "conventions", but at CATA we prefer to call them "seminars" (that's why we call it "CCOS" for the **C**ATA **C**able **O**perator's **S**eminar). There is a simple reason for this. We have always tried to involve our members directly in what is going on at the meeting—either through "hands-on" projects, or through special workshops, or just asking questions of the folks on the panels.

At last year's CCOS we tried something new—a satellite transmission of major portions of the meeting so that folks who could not get out to the sessions themselves could at least see what was going on. It worked very well, and a lot of people watched. But the technology did get in the way. Because we had to use a "studio" set-up the participants at the seminars didn't get as much of a chance to pitch in with their comments, questions, and so on. So this year we are going back to our basic philosophy of getting everyone into the act. This is a working meeting, where CATA members and others can come to exchange information and ideas on how to improve the services we are offering to our subscribers and how we can be sure that we will be allowed to do so in the future.

Of course CCOS is not all work. It's also a time to visit with a lot of our friends who we haven't seen since last year and sit around the pool with a beer and just gossip—but have you ever noticed that the "gossip" usually comes right back to what's going on in franchise fights, or who is about to do what to us in Washington?

Another major part of any meeting is the activities of the Associate members. Without them, and their support, we would not be as successful as we are. The best way we have of showing how grateful we are for that support is to be sure to see the new equipment and supplies they have to offer during the convention and the new programming some of them are offering too! There is nothing better for the Associates or the Association than for all of the suppliers to go home from the meeting with new orders in their pockets from us—if you are going to buy something for your system this year anyway, be it a fitting or a format, pliers or a program, now is the time to do it, from the Associates at the show.

From CATA's standpoint the purpose of a yearly get together is to learn from each other. It's no fun, and of little benefit to just sit in meetings all day and listen to somebody up on the stage lecturing to you. Sure, the "experts" know a lot, and they can shed a great deal of needed light on any particular subject from amplifiers to zero-based regulation. But if you don't understand what they are saying, or if you have a different idea on how to do something (usually, from CATA members, a less expensive way!) then pipe up and say so! It's your meeting! We want the benefit of your experience and your ideas whether you are up on stage or not.

As usual CATA has decided not to have a whole bunch of Washington bureaucrats and politicians come out and talk at us. That's not to say such meetings aren't any good, but we all know what they are going to say anyway, and their positions, in their set speeches, have already been taken—at least for the purposes of the speech. There is very little give-and-take in that kind of format and we are just as happy that other parts of the cable industry create that forum for the Washington speakers. We would prefer to hear from people out in the "real world"! I'm not knocking the Washington lawyers, politicians, and bureaucrats—we do have to listen to what they have to say—but that has been done already, so why repeat it?

My major message for this month, seeing as how you will probably be reading this, as a CATA member or Associate, while you are on Lake Geneva at the show, is that it is **your** show, and we need **your** input. There are a lot of issues that we have to deal with, as you know. Not only do we all want to improve our services to subscribers with better technical answers to particular problems like grounding, or amplifier extensions, or new antenna configurations, we also want to know what your experience has been in marketing new services, or repackaging old ones—pricing policies and billing procedures, program production and franchise renewals. In other words all the things that you know best from your own experience.

On the other side of the coin, we are all going to have to sit down together and decide what we, as an Association, need, and want to do with regard to the latest threats to our business coming out of Washington and most of the State Houses. What will "program consent" really mean for the independent operator? What can we do about it? Who knows who on Capitol Hill and how do we get our message across? What about the telephone companies? What will happen if they are allowed into the business? What are the remaining problems you are running up against at the FCC and what can we do to get rid of those? All of these things will be on the agenda for discussion either in the panels, during the open Board meeting of the Association, or around poolside. So get your "thinking cap" ready and jump in when you have something to say—that's the only way we can all learn—from each other.

I'm looking forward to visiting with you all at CCOS '79. Let's make this the best CATA meeting ever!

A Top Engineer... On Fused Disc Cable

Bob Bilodeau, Vice President, Engineering for Suburban Cablevision of East Orange, New Jersey had this to say in a recent letter to us:

"...our use of General Cable's Fused Disc is based on its electrical properties and its installation handling characteristics.

"Since June, 1975, I've used Fused Disc to construct nearly 1,000 miles of dual trunk cable system. Neither Suburban, nor our contractors have experienced any mechanical difficulties with underground or aerial placement.

"Additionally, we are able to take advantage of the lower attenuation characteristics and lower loop resistance properties in terms of amplifier spacing (electronics density) and the parameters of power supply per mile of plant.

"I plan to continue constructing with Fused Disc cable for the remaining 1,600 miles of our franchised northern New Jersey area."

Suburban Cablevision is the largest CATV company in New Jersey and has recently connected its 60,000th subscriber. Our successes are mutual.

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"Now I can reach population pockets without emptying my own."

"Loleta had 195 potential subscribers, Hydesville, 190. That's plenty if you can reach them economically," says Sam Shults, President of Redwood Cable Vision in Fortuna, California. And that's exactly what Sam did. He reached these and other small communities economically and profitably with a Hughes AML microwave system feeding 50¾ miles of aerial distribution. Even though receiver sites range from berry patches to the second floor of a dairy, service requirements and downtime have been minimal since installation in 1972.

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Sam says he opens the receivers so seldom they're often covered with cobwebs.

Hughes AML receivers are cable powered and designed to work outdoors from −40° F to 120° F. Although Sam is transmitting nine channels, AML systems have 40-channel capacity with VHF input and VHF output. So when Sam added two channels to his transmitter in 1976, he didn't even have to touch his AML receivers.

These and other advantages of AML microwave are the result of fourth-generation proven design by Hughes. There are now more than 6000 video channels being distributed by Hughes AML receivers around the world.

For more information on Hughes multi-channel microwave systems, write Hughes Communications Products, P.O. Box 2999, Torrance, CA 90509. Or call (213) 534-2146. We'd like to help population pockets fill your pockets.

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We would like to see the following material taken from back issues of CATJ repeated:

Below are some suggestions for areas of discussion that I would like to see in CATJ:

THANK YOU for taking the time to fill out this information. Please tear out this sheet and send to the following:

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4209 N.W. 23rd, Suite 106
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A BULLETIN FROM EASTERN MICROWAVE ON WOR

SUBSCRIBERS SURRENDER TO WOR-TV SPORTS LINE-UP

As a cable system owner, you know that the best way to add and keep subscribers is to offer top alternative viewing. This includes a station your customers can turn to for all the popular major sports. WOR-TV (New York) via Eastern Microwave is the winning strategy that will capture subscribers for your cable system.

As the nation's largest sports station, WOR programs more than 700 hours of live sports each year. This breaks down to approximately 200 live local events per year. No other station carries as many.

Included on the schedule are six professional teams: The Mets, Knicks, Nets, Rangers, Islanders and Cosmos.

In addition to these professional team sports, WOR programming includes Penn State collegiate football (delayed) and harness racing from Yonkers. Twice a week, 52 weeks a year. This year, the Amazin' Mets are scheduled for 132 televised games, while the Cosmos, North America's best soccer team, appear 13 times.

All this adds up to an endless season of sports for your viewers and a proven profit-maker for you. Subscribers unconditionally surrender to the cable system that offers WOR-TV.

WOR KNOWS WHAT SUBSCRIBERS WANT

Eastern Microwave supplies the heavy artillery. Call Sam Morse or Charlie Mills at (315) 455-5955.

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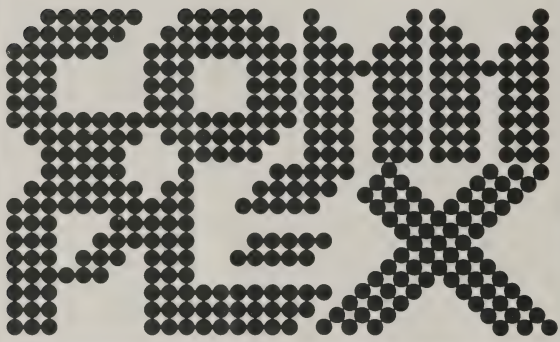

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THANKS A MILLION

We want to thank all of you who stopped by our booth in Las Vegas. In fact, thanks a million for helping us to add over a million dollars in Earth Station package orders. Proof again, that Gardiner's breakthrough of a lower cost, high quality Earth Station Package is what you, the operators have been asking for.

If you haven't looked into the Gardiner turnkey offering, please call today. Gardiner's complete turnkey package includes delivery by an experienced project foreman assuring you of a speedy, professional installation and activation.

Gardiner's package includes a full 5-meter AFC prime focus antenna, dual feed and mount. An Avantek or SCI 120°K LNA. A Microdyne or SCI single channel field tunable receiver. Quality cables and connectors. And delivery and installation.

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If you haven't ordered, get the facts today — Call (713) 961-7348 and ask for Don Meyers, Phyllis Thompson, Bill Kassemos, Wally Briscoe or Cliff Gardiner. Call now and prove to yourself how easy and economical it is using the Gardiner single channel earth station equipment package — **now only $10,500.**

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Scientific Atlanta

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Back To Hands-On Sessions

CCOS-79
ON LAKE GENEVA

CCOS PLANS IN THE FINAL STAGES

As the time gets closer to the CCOS-79 dates, the plans get more exciting! Not only are the sessions all set with tremendous program material, but the entertainment and family activities planned **every** night will balance a meaningful and memorable time at The Abbey in Fontana, Wisconsin.

Our days will be full of carefully planned sessions and the nights brim full of entertainment and fun. There will be time after the first Exhibit Hours on **Sunday** evening to re-acquaint yourself with friends you've met at CCOS previously. After a full day of sessions on **Monday,** the dinner hour will be free and beginning at 7:30 p.m. the Exhibit Hall will be open again until 9:30 after which the bowling alleys, lighted tennis courts, and swimming pools can be used for relaxing.

Tuesday night will be a big entertainment night beginning after the close of the Exhibit Hall with a cocktail party sponsored by some of the suppliers and a first-class entertainment act that will be a delight to the whole crowd, and one of the highlights of CCOS-79. **Wednesday** will be the annual cocktail party and Bar-B-Que, after which CATA will stage a Casino Night, complete with dealers, cards, crap tables, slot machines, etc. (Participants will each receive a pre-determined value of chips to use in play!!) Following the Casino time, a very special type auction will be held and some of the items are super! Many of the suppliers have donated very worthwhile items of equipment or "gift certificates" and everyone will be able to bid on these items with **all** the chips they won at the Casino tables.

All the participants are invited to bring something along to be auctioned if you have some used, second-hand equipment that might be used by someone else; also wanted are **interesting regional** ideas, or **ladies crafts,** or **"white elephants"**. Put you imagination to work and bring something along to participate in this auction. We think this is going to be a fun-filled evening and want to encourage all to plan to attend and wrap up another outstanding CCOS meeting at this casino night & auction.

Listed below are the panel categories from which you can choose what sessions you would like to attend. We have been so pleased that many of "non-professional lecturer" type people have agreed to participate in some of these sessions where they had particular expertise, and this is going to be the key to one of the most outstanding programs any of the participants have attended.

The Program Committee, made up of CATA Director Ralph Haimowitz, and Earnie Larson and Raleigh Stelle, Associates' Director and Vice Director respectively, have been very busy people and have put together a program that is superior in every way. This program returns to the involvement of the participant in the sessions and follows the survey suggestions taken from past CCOS participants as to what type sessions they wanted. In discussing the different program areas, many names were suggested for possible participation in the panels; from this kind of participation, we feel those attending will be able to relax and relate to the panels under these circumstances, and those that have heard about the program, with this particular concept, are very excited about its prospect of success.

Don't worry, you tinkerers, there will be a lab for sick equipment!!! In fact, two have been planned so that everybody can get in and get to work with an expert to find the problems. Again, our reliable friend and expert, Hansel Mead, will be manning one of these Lab Rooms. In addition, he is participating on the program in a very impor-

tant session on Bonding and Grounding, which will follow the special presentation on Lightning and Power Surges (see insert below) which has been acclaimed as the best information on this subject by any that have seen this presentation. Because of the importance of this particular subject and the intensity of the lightning problem, we have scheduled this session twice to give everyone the opportunity to attend and still not slight another subject of interest to them.

Oliver Swan will be there for two sessions on rural cable systems, and any of you that have attended in the past know how popular a session he always holds, and the tremendous approach he takes to his unique situation. A self-taught computer expert who geared a computer program to fit his cable system will be there to tell you how to do the same thing in adapting computer services to the complexities and peculiarities of the small cable system. Some real experts, guys that have actually built their systems using this technique, will conduct the panel on underground construction. CATA member Wayne Sheldon from California has suggested that this was such as interesting operation when he worked to build his system, so he spoke once too often, and got himself volunteered to cooperate on this panel, and we think it's going to be a good one!

But, and again, due to many popular requests, **Tuesday** will be filled with **Management** sessions, dealing with subjects that our ladies have requested that they would like discussed for them. More and more women are actively involved in the business operation of cable systems, and we have set aside Tuesday, free from other ladies activities on a large scale, so that ladies, if they choose, could attend these different management sessions and hear it from those that **do** the marketing, the filing of necessary required annual reports, forms, tests, etc, and conduct the general office procedures as far as billing, work orders, telephone techniques, etc. The fourth Management session will be one directed toward the surviving spouse of a cable television operator; this will cover where to go for legal advice, decision making on the possibility of selling or not, placing the value on a cable system, pre-planning, etc. This is a very involved session and one that will attract many for this information.

An interesting session will be the **construction of an earth station,** complete with sighting-in, testing procedures, and the actual tightening of bolts, etc. This will be a step-by-step procedure on the erection of an earth station so that the small system operators can accomplish this installation. One of the hottest items in our business today is the **Multiple Distribution System** better known as M.D.S. and this will be explored in a session so that cable operators can explore the potential of providing program services to rural areas.

MANAGEMENT 1 - Reporting and Filing. Covers all required annual reports, forms, tests, required records, etc. - Steve Effros

MANAGEMENT 2 - How to Survive. A program directed toward the surviving spouse of a cable television operator. Covers where to go for information and assistance, legal advice, deciding to sell or not to sell, taking the reins of operation, obtaining financing, placing a value on the cable system, pre-planning for the future, etc.

MANAGEMENT 3 - Marketing Technique. Covers all aspects of marketing a small cable television system, both basic and pay cable.

MANAGEMENT 4 - General Office Operations. Covers billing procedures, work order procedures, proper telephone techniques, files and records, customer relations.

EARTH STATIONS - Construction, Sighting-In, Testing Procedures. Covers step-by-step procedures for small system operators to accomplish do-it-yourself installations and operation of a small earth station.

FCC PROOF OF PERFORMANCE TESTING - Covers Step-by-step instructions for the small cable operator to complete proof of performance testing on his cable system.

M.D.S. - Covers information on use, operation, security, potential need, etc. for cable operators to provide program services to rural areas.

LIGHTNING/POWER SURGES and How They Affect Cable Television Systems - Explains the phenomena of lightning, potential current flows, side flashes, effects to aerial and underground cable plant, what protection can be made.

BONDING & GROUNDING - Covers proper bonding and grounding of cable systems to reduce damage from the effects of lightning and power surges - from the head-end to the subscribers home.

UNDERGROUND CONSTRUCTION - Presents all aspects of installing buried cable plant-do's and dont's - and reveals some cost savings techniques.

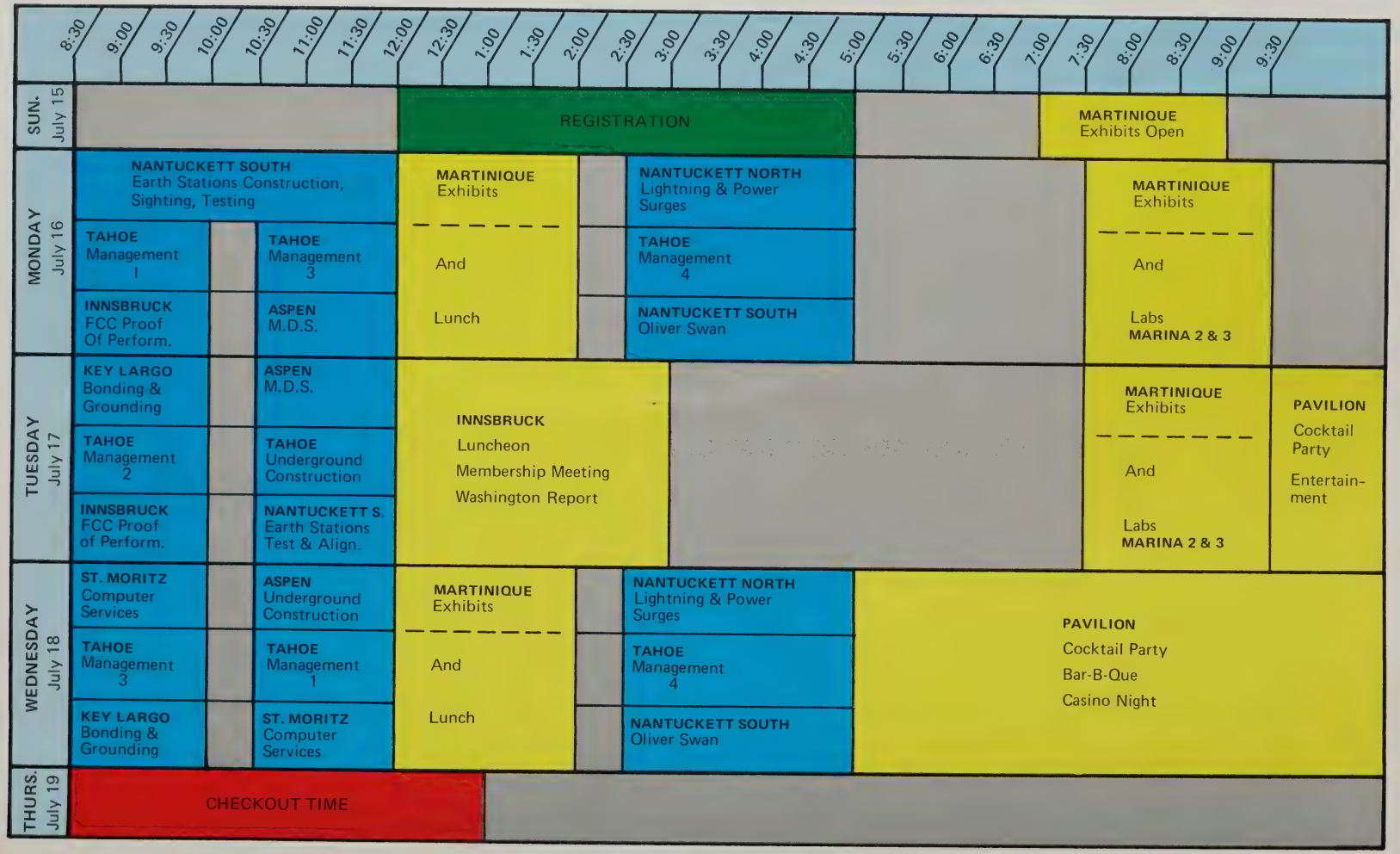
COMPUTER SERVICES - Covers those services available to cable operators on a contractual basis for computer services. Also includes owner operated micro-computers and programming for small cable television systems.

OLIVER SWAN - Building, operating, and maintaining a small cable system on a shoestring.

The CATA Board and the Program Committee very much appreciate the willingness and enthusiasm that has been demonstrated by those asked to participate on the different panels, and it is with this enthusiasm, added to the casual concept of the **C**ata **C**able **O**perators **S**eminar, that we can be assured of one of the most outstanding programs to date.

The Exhibit Hours will be full of another form of learning, as many new products and services will be presented for your inspection as you tour the exhibit hall and visit with the companies represented. The suppliers that have registered have expressed their interest in meeting with our group, and are looking forward to having the opportunity to tell you about their products and services. From the past, the suppliers have been gratified with the interest generated from the Exhibit Hours during CCOS, and with the new

CCOS '79 Schedule



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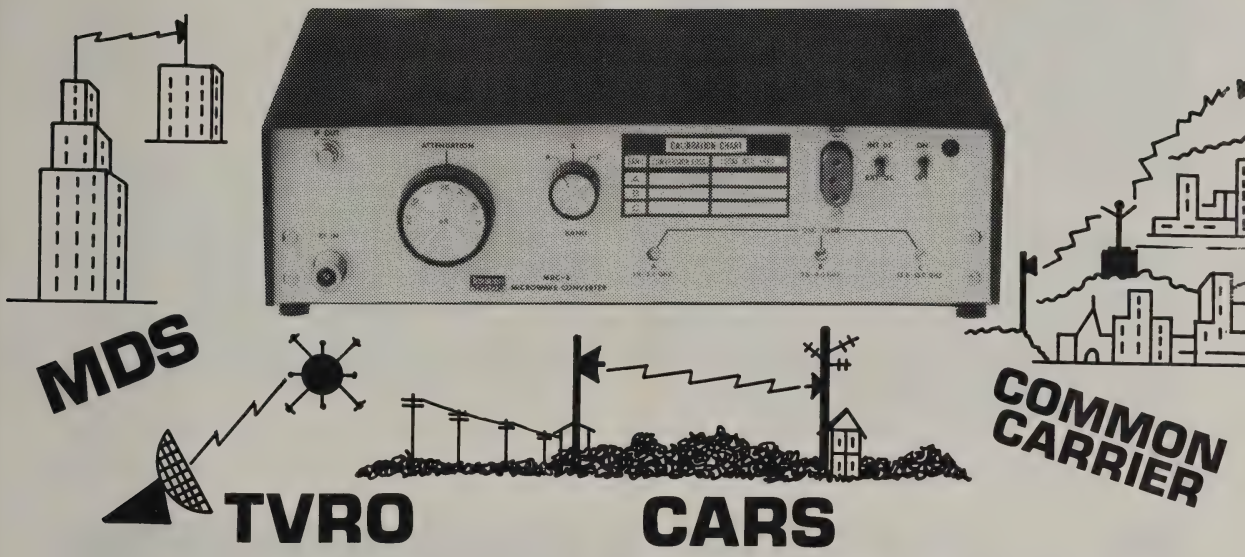

Texscan's microwave down converter permits measurement in the MDS (2.1 GHZ) TVRO (3.7 GHZ) and CARS (12.7 GHZ) band with existing VHF test equipment. Spectrum analysis, signal strength and even microwave sweeping are possible with the MDC-3.

Available as an option are three bandpass filters which speed and simplify the measurement process. The filter kit is required for sweep operation. The MDC-3 has a calibrated insertion loss and adjustable local oscillator for each band. Other frequencies are available.

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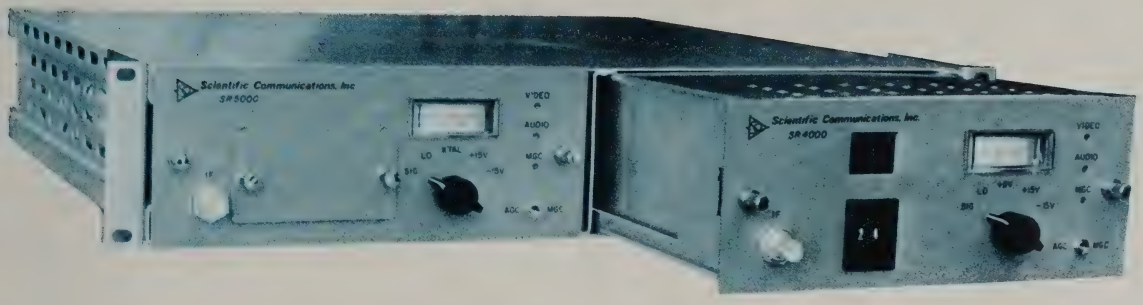
One of the most devastating problems facing cable systems is that of lightning and power surges. In line with the need for solutions to this problem, CATA searched for the leading authority in this area; **Dr. Rodney Bent** of Atlantic Science Corporation is that authority, as his study of lightning percipitated into the specific area of its effect on cable systems. Dr. Bent has a degree in Physics and a PH.D. in Atmospheric Electricity from the University of Ducham in Great Britain. Dr. Bent has written numerous studies on lightning and its behavior, and acts as a consultant for many private organizations as well as government agencies throughout the world. Dr. Bent has made this lightning presentation before cable groups in the Southeastern part of the United States, and it was from this experience that he was recommended for this session at CCOS-79. Dr. Bent's program at CCOS will prove to be one of the most interesting and informative technical sessions ever presented by CATA, and you will be privileged to have this experience.

technology on the foreground at the present, we are certain that the exhibit time will be worthwhile as well.

For the ladies, aside from the Tuesday management sessions, different events are being planned, beginning with the CATA Brunch for all the ladies, giving the Board an opportunity to welcome the ladies of CCOS and give them an opportunity to meet each other as they go into this three-day session. From that point on, there will be tours and activities of varied interest so that the ladies can be well entertained as the men go about the business of their sessions. Again, there will be the Ladies Craft Room, where each lady can bring a craft item(s) and there can be an exchange of ideas and information. This was such a tremendous success last year that we were asked to repeat this for CCOS-79. And from what is rumored, it looks like more crafts will show up this year. Bridge tournaments, bowling tournaments, and tennis games will take care of the ladies that want to participate, along with the group activities planned. The swimming pools at The Abbey are inviting spots for sun bathing, but if you want to stay out of the sun, the indoor botanical swimming pool with the separate health spa (complete with masseuse) and whirlpool is a place where even the most over-worked lady will find the "R & R" that she wants from such a resort.

If the children are coming along, bring lots of quarters because all the machines, pool tables, and foos ball tables in the recreation hall will require them. Or just bring dollars, and there will be someplace to change them into quarters. Also in the recreation hall is a hamburger/hot dog type food bar (also pizza) where the young ones can eat without having to be subdued for the dining areas. The bowling lanes are also located in this

SATELLITE VIDEO RECEIVERS



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Compact Modular Construction

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Simplified Testing

Both receivers were engineered to provide a simple method of testing in an operational environment. A meter and selector switch on the front panel permit the monitoring of critical voltages and the IF monitor output is available at the front panel. An AGC/MGC switch and a manual gain adjustment are also located on the front panel. The rear panel contains an auxiliary video output to allow monitoring of video performance without disrupting programming and an extra pair of audio outputs to facilitate audio monitoring.

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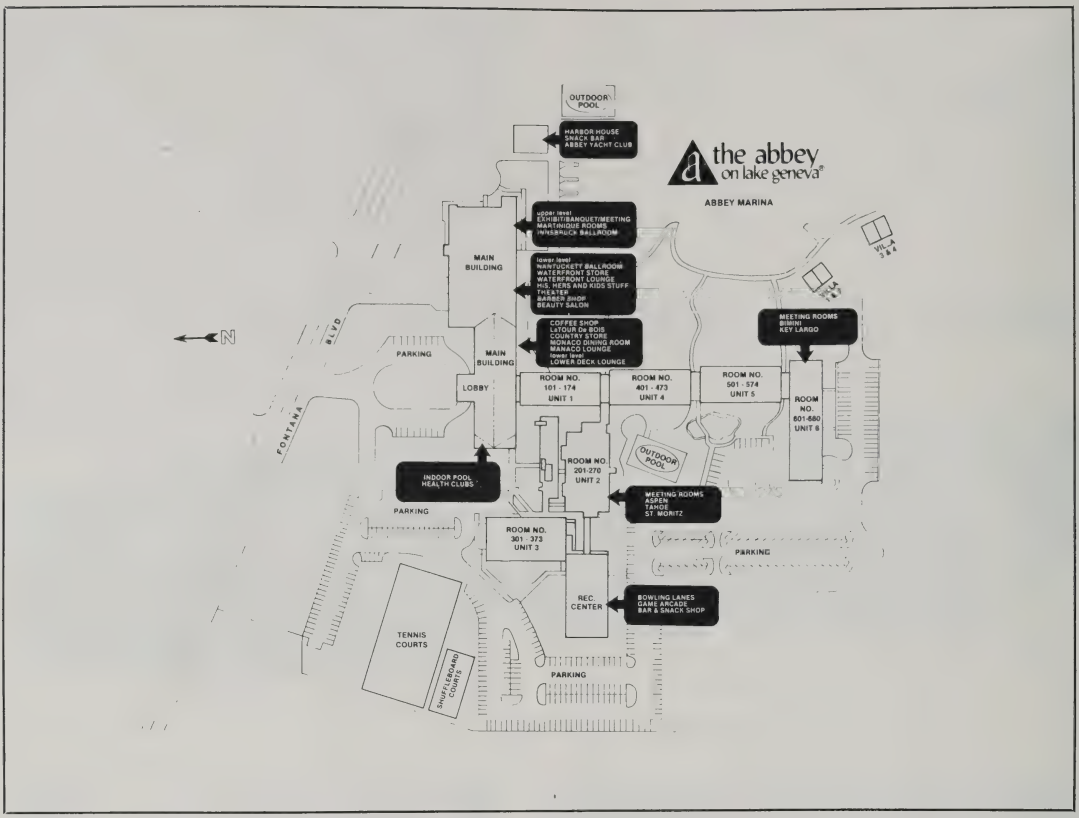

area, which is connected to the building, so there won't be a problem for safety as the children go back and forth into this area.

Golf greens. . .tennis courts. . .sailing. . .all this in this lovely area that will be speckled with the dishes pointing toward the satellites, and all the drop cable and lines running into exhibit area, which is usually a banquet or ball room area. The Abbey people don't really know how to anticipate our group with all its peculiar equipment, but they're anxiously awaiting our arrival, and it will be something for them to report in their portfolio as they travel about the country.

The schedule is full, beginning with Sunday night, and continuing for **three full days and three full nights,** and we encourage all attendees not to miss an event! You will also have an opportunity to hear about Snowmass, Colorado, where CCOS-80 is planned for next July; again, a resort type area has been chosen to continue with our family concept with the casual approach, and we feel you will be impressed with the material that you will be shown of Snowmass.

As part of the program you will be given, there is a survey in the back portion of the book which we ask that you take the time to fill out and return to the registration area. Our intention in planning CCOS is to make it the program that you want, and we can only know what you want

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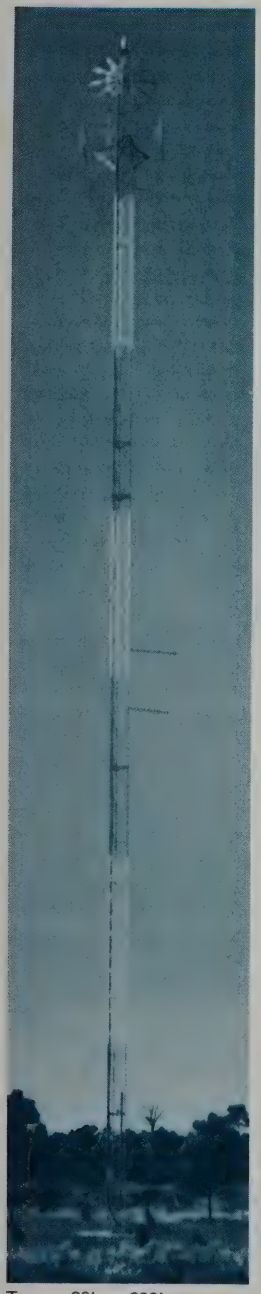

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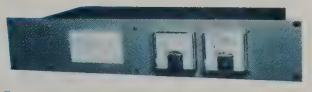

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when it is fed back to us. So, we ask that you oblige us by providing your comments, criticism, suggestions, etc. before you leave The Abbey. Also, **everywhere**, you will see **CATA Directors** busy overseeing the different sessions, so if you have any input for them, talk to them as the Board will have a Critique meeting immediately following CCOS-79, early Thursday morning before checking out, so that we can iron out any difficulties while they are still fresh in our memory. Not only will it give you an opportunity to become acquainted with the CATA Directors, but it will afford the time to tell them how you feel about the planning of the CCOS, how you feel about the CATA stand on different bills and political problems, and what direction you would like to see CATA go. This is an important time for cable operators as the Rewrite is approached, and you will hear a lot about this as CCOS from CATA's Executive Director, stationed in Washington, D.C., Stephen R. Effros, when he gives his Washington Report at the Tuesday noon luncheon.

The CATA Board, Staff, and all Committees are excited about CCOS-79, as it approaches, and look forward with anticipation to your arrival and participation in the program. We hope that you are satisfied with the program and that as you leave The Abbey, you are gratified that you were a part of it and that you will be with us again at **CCOS-80 in Colorado!!**

A New Bird Generation

TECHNICAL PARAMETERS FOR ANIK SERIES CANADIAN SATELLITES

by
I. Switzer, P. Eng.
Switzer Engineering Services
5840 Indian Line Road
Mississauga, Ontario
L4V 1G2

INTRODUCTION

The object of this paper is to present, on an informal basis, some of the major parameters of Telesat's satellite system. This will provide (Canadian) CATV operators, who may be thinking of purchasing their own TVRO, necessary technical information to ensure a degree of compatibility between their equipment and the present and planned satellite system. A detailed Technical Guide for service users is presently being prepared by Telesat and will be available as soon as service contracts are finalized.

THE UPLINK

At the present time, although no permanent CATV services have been contracted for, we anticipate the signal quality requirements will be similar to our present video services and therefore the signal parameters and deviations are expected to be the same as used for our CBC channels on Anik 3.

Each video uplink will contain an NTSC colour video signal with a 30 Hz triangular energy dispersal waveform synchronized to the frame rate of the incoming video signal. Audio subcarrier(s) are added above the nominal top video frequency to carry audio signals. Initially, one frequency modulated subcarrier will be provided at 6.8 MHz, **additional** subcarriers, if required by a customer, would be placed at **6.17 MHz** and **5.41 MHz.** The video is pre-emphasized before modulation using a CCIR standard pre-emphasis curve. Audio pre-emphasis, using a

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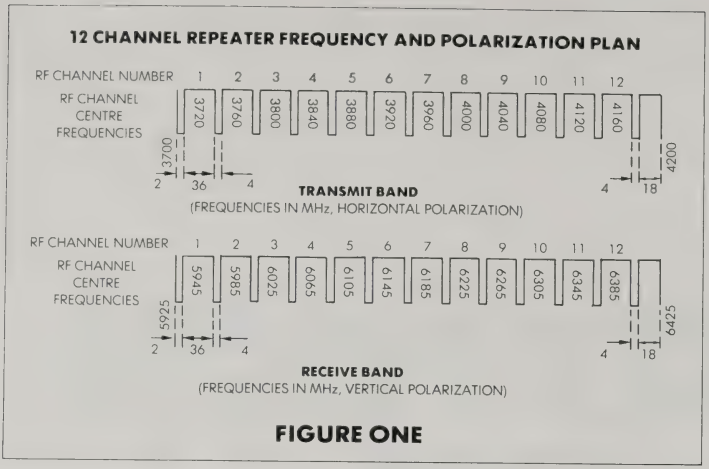

FIGURE ONE

CCITT standard, is provided for the 5 KHz audio channel.

The composite baseband (Video, Dispersal Waveform and Subcarrier) is frequency modulated onto a transmit RF carrier. The deviations will be set and maintained to the following values:

Video Deviation: 11 MHz peak (adjusted for a 750 KHz sinusoidal tone at 1V peak-to-peak)

Energy Dispersal: 1 MHz peak

Subcarrier: 2 MHz peak (6.8 MHz)

The audio subcarrier will be frequency modulated by a 5 KHz audio program channel with a nominal peak-to-rms factor of 10 dB at 1 KHz. The deviation will be set and maintained for the following value:

Audio Deviation: 50 KHz rms (for a +8 dBm 1 KHz test tone)

Note: The peak deviation, with program material, may exceed 160 KHz on instantaneous program peaks.

SATELLITE CHARACTERISTICS

We have a number of different "generations" of satellites, both in-orbit and planned. These are identified by letter series (A,B,C,D), and "Flight" number or launch sequence (1, 2, etc.). Each of the different series have characteristics which are unique to them, and therefore represent potential compatibility problems unless the differences are taken into account when planning a TVRO installation.

The Anik A Series

This series was our first satellite type. Three of the "A" series were launched and are presently in-orbit (A-1, A-2, A-3). They are characterized by a 12 RF channel repeater (10 operating, 2 standby) operating at 6/4 GHz with an All-Canada coverage antenna pattern. Anik A-3 is presently the primary operating satellite carrying our full-time services. Anik A-1 and A-2 are nearing the end of their useful lives, (A-1) was launched in 1972 and (A-2) in 1973. Anik A-3, although relatively "healthy" has been operating nearly 4 years to date. Therefore, the need for the next series, the Anik B, to maintain our protected services.

The Anik B Series

Only one of this type has been constructed and launched. It is designed to provide service continuity, with A-3 as a backup, until the first of the **Anik D** series of 6/4 GHz satellites is launched in **1982.** Anik B is unique in that it has somewhat higher EIRP than the Anik A satellites and provides a "Dual-Band" capability. It provides 12 RF channels (10 operating, 2 standby) at 6/4 GHz and an additional 4 channels (2 operating at a time) at 14/12 GHz. The 14/12 GHz channels are leased by the Federal Department of Communications to continue their Pilot Projects, which were started on the CTS "Hermes" satellite. Anik B-1 is presently in-orbit and was used to provide House of Commons Interim distribution on two RF channels prior to the dissolution of Parliament during March of this year.

Present plans are to transfer Telesat's full-time services from A-3 to B-1, and to place any CATV services on A-3, early this summer.

The Anik C Series

This series of satellites, presently under construction for launch starting in early 1981, will operate exclusively in the 14/12 GHz bands. They will provide 16 RF channels, each with a 54 MHz bandwidth, configured in a Frequency-re-use cross-polarized plan (8 + 8).

The Anik C will have 4 spot beams (or 2 "half-Canada" beams) on the downlink with Southern-Canada primary coverage. Video services will be provided using a dual carrier per transponder transmission mode.

The Anik D Series

Contract negotiations are presently underway with a spacecraft supplier for construction of the Anik D series of satellites. These will provide All-Canada coverage at 6/4 GHz with 24 RF channels, configured in a frequency re-use, cross-polarized channel plan (12 + 12). **The Anik D will replace the A and B series for 6/4 GHz services.** The first Anik D is expected to be in service by late 1982.

ORBITAL POSITIONS

Telesat presently has three orbital positions occupied:

POSITION	SATELLITE
104°W	Anik A-1
109°W	Anik B-1
114°W	Anik A-3

with Anik A-2 in a parking position co-located with Anik B. Future positions are expected to be the same but it is always possible that future replacement satellites would be

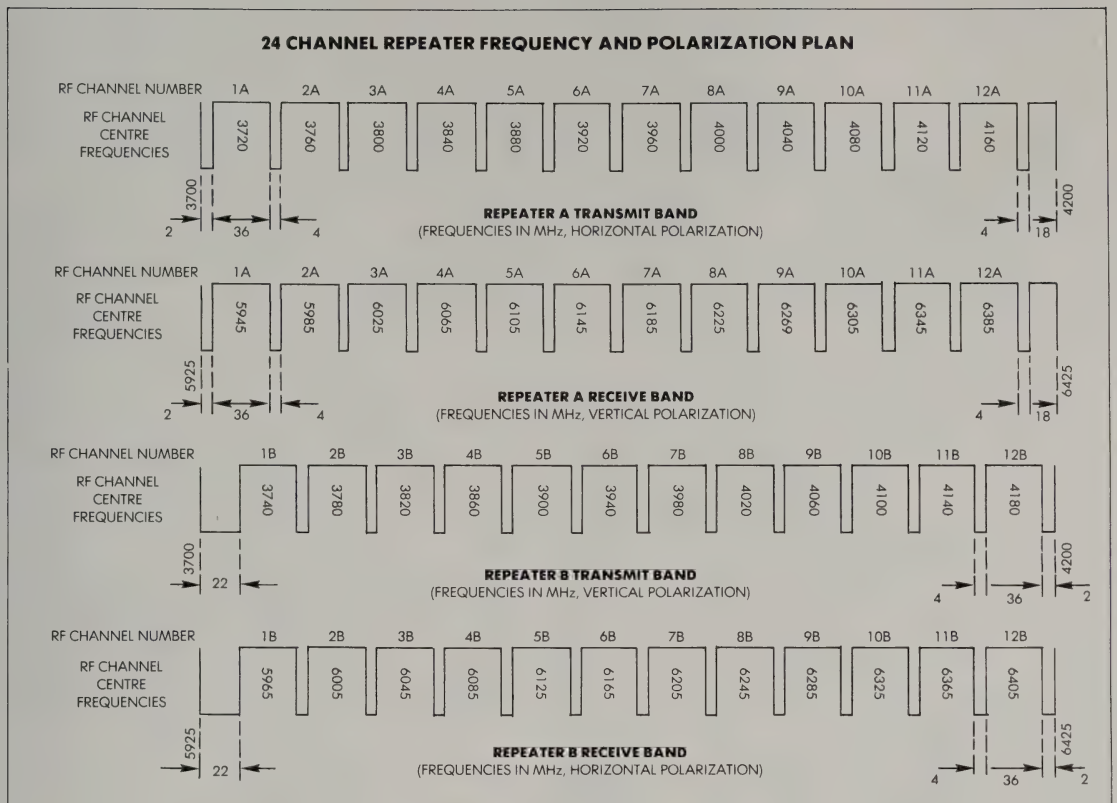

FIGURE TWO

assigned different locations. However, we expect potential positions to all be within the 100°W to 119°W orbital arc.

FREQUENCY AND POLARIZATION PLANS

For the 6/4 GHz satellite series (A, B and D) there are two different frequency and polarization plans. The Anik A and B satellites use the 12 channel plan shown in figure 1. The Anik D series will use the dual polarized plan shown in figure 2. This plan is characterized by the 20 MHz frequency offset between repeaters A and B, needed to minimize interference effects between the cross-polarized channels. When the Anik D series is put into service, the cross-polarization isolation of the earth station antennas will be an important factor to plan for.

ANTENNA "FOOT-PRINT" AND EIRP

Typical "foot-prints" or antenna patterns are used to provide a means for estimating downlink EIRP for a given location in the coverage area. The "foot-print" is really a predicted antenna pattern, based on spacecraft factory test data, combined with TWT output power data, and modified by measured in-orbit data taken at Telesat's Heavy Route earth station at Allan Park, north of Toronto. Actual in-orbit patterns of the spacecraft may differ from those predicted from on-ground test data. Therefore, measured signal levels at a given location in the coverage area may be less than the "typical" value, **particularly as the spacecraft nears the end of its lifespan.** In using these foot-prints for TVRO design, one must therefore remember that aging and inaccuracies in predicts can lead to long-term signal levels 1 dB or more **below** the "typical" values. A "typical" pattern for our Anik A-3 satellite is shown in figure 3. Similarly, a foot-print for Anik B is shown in figure 4.

TVRO COMPATIBILITY CONSIDERATIONS

After having discussed the various technical parameters of our present and planned satellites, I would like to summarize what I believe to be some important factors which should be considered in selecting a TVRO design, in order to ensure compatibility with the satellite system:

(a) **G/T**
Keep in mind, when selecting the G/T, the possibility of RF channel switches or satellite changes and de-

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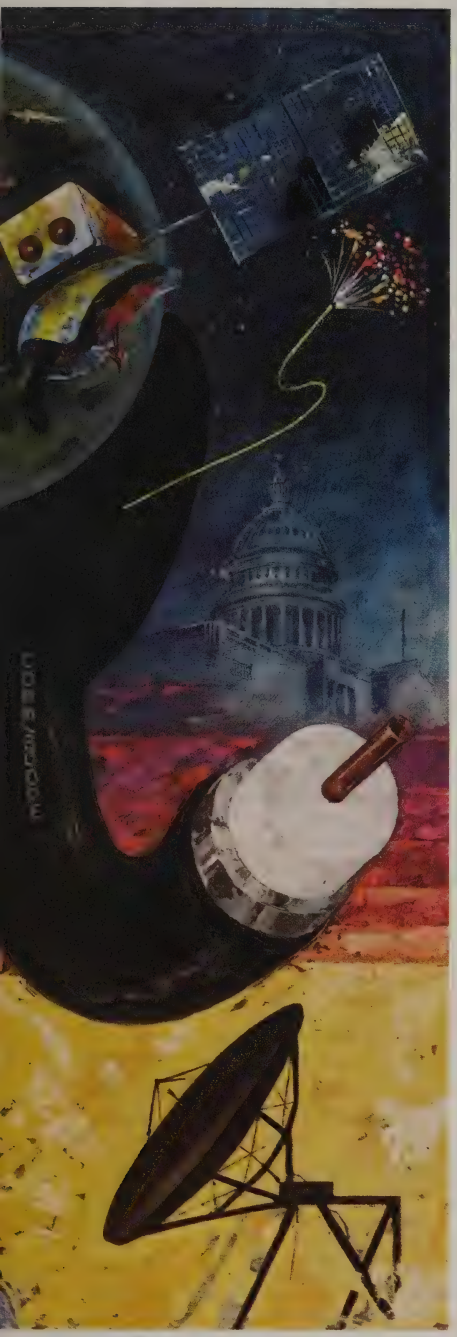

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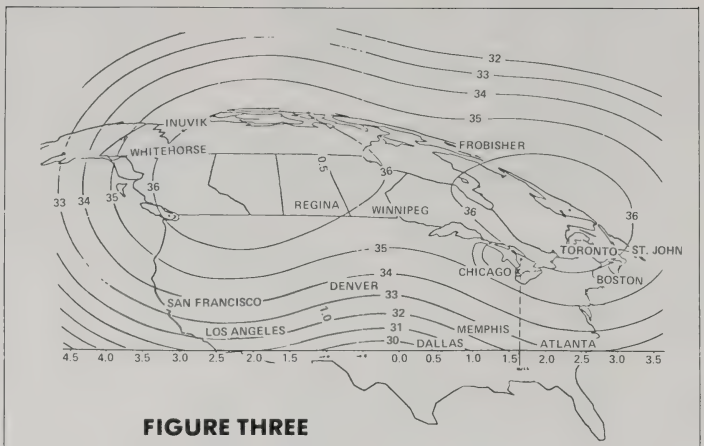

FIGURE THREE
TYPICAL ANIK A FOOT-PRINT

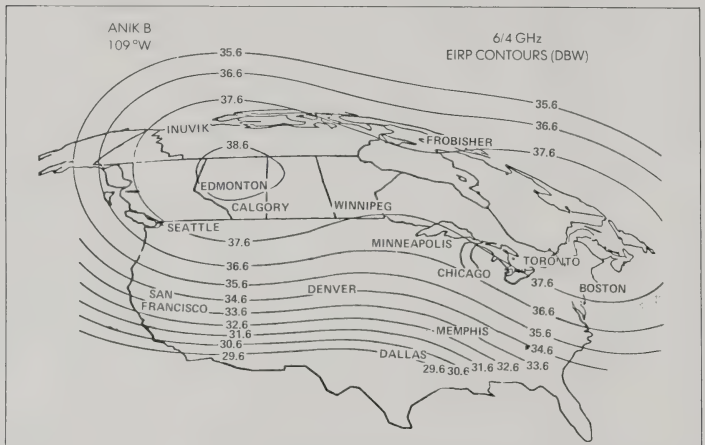

FIGURE FOUR
TYPICAL ANIK B FOOT-PRINT

gradations reducing the signal level below the value initially received.

(b) **Antenna Pointing Range**
Ensure that the foundation and antenna structure allow re-pointing of the antenna to the other possible positions (100°W to 119°W).

(c) **Polarization**
Anik D will be cross-polarized, therefore, antenna polarization isolation and, perhaps, the availability of a dual-polarized feed should be considered.

(d) **RF Channel Re-Assignment**
Because of failures or other reasons, RF channel re-assignments may take place. Frequency change capability, either by frequency agility, or by manual replacement of a crystal and filter, for at least one other (standby channel) frequency is a necessity for the receiver.

(e) **Additional Audio Services**
As mentioned earlier, a single audio circuit is planned to be provided. However, if required by the service contract, additional audio circuits would be implemented by adding subcarriers (most likely at 5.41 MHz and 6.17 MHz). Therefore ensure that the receiver will support additional subcarriers easily.

(f) **Audio Pre-Emphasis**
Pay attention to this factor in dealing with your TVRO supplier. The pre-emphasis which we use for our 5 KHz audio channels is **not** compatible with the 75 usec, 15 KHz pre-emphasis normally used on U.S. subcarrier equipment. Also, if you intend to use the receiver for occasional pick-up from our CBC program transmission channels, ensure that the subcarrier receiver has a good 5 KHz low-pass filter, otherwise the Audio No. 2 channel will cause annoying interference.

COORDINATION AND LICENCING

Prior to being placed into service, each earth station must be licenced by the Department of Communications. An essential step in this licencing procedure is the coordination on the site with agencies which operate 4 GHz microwave systems which could cause interference into the earth station. Selections of a site which will minimize the interference will be critical in ensuring good service.

Don't forget **CATA'S CASINO NIGHT AND AUCTION** Wednesday, July 18. Plan to bring something for the auction and use your chips to bid on the items. Fun for the whole family!

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Real-World Technology
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A BIPOLAR LNA FOR THE 3.7 TO 4.2 GHz BAND

The amplifier to be described provides a low cost method of obtaining 20 dB gain at 4 GHz with a noise figure of 3 dB (290°K) or better. In a TVRO installation with a short feed-line between antenna and receiver (given a receiver of medium-to-good sensitivity) or with an antenna-mounted down-converter, 20 dB is an adequate level of gain for the LNA noise to override that of the receiver. In a more general TVRO situation, rather more gain will be required in the LNA—the amplifier described should then be followed by 3 stages (or so) of **bulk gain** using less expensive transistors (HXTR-6105 or 2101 would be suitable) to increase the gain of the LNA to around 50 dB. But we shall limit ourselves at this time to describing the two-stage 20 dB design.

The 3 dB noise figure quoted for this amplifier is a conservative value. Transistors vary within the limits of their specification, both in their noise figures and their S-parameters, typical values of which were used to design the matching networks to present optimum source and load impedances to the transistors, in attempt to minimise the noise and maximise the gain across the 4 GHz band. A fortuitous combination of **spreads** could easily result in a 0.5 dB improvement in noise performance, i.e. to 225°K. But since most experimenters will not have acess to the test equipment needed to optimise the amplifier performance, the 290°K figure is probably more realistic.

Whether this level of performance is **good** enough to obtain viewable pictures depends on several variables. The one we can do least about is the bird's EIRP towards our location on the transponder(s) of interest. Antenna gain we can change, but it is costly to come by. Demodulation bandwidth and noise immunity are easier quantities to play with, especially in the home-brew receiver. But these trade-offs have all been covered in earlier issues of this column, so I only mention them here for completeness—no use hooking up a 290°K LNA to a 2.4 meter antenna in a 31 dBw footprint zone and expecting studio-grade video out of the receiver.

But for those requiring a **lower** LNA noise temperature we shall publish in a future issue a similar constructional article for a single stage of GaAsFET amplification, to which this month's amplifier will form an ideal second and third stage, to make an LNA with noise temperature below 200°K and gain above 30 dB.

LNA DESIGN

Characterisation of transistors at microwave frequencies involves a somewhat different procedure than in the more familiar HF and VHF frequency ranges. The traditional 2-port network parameters H, Y and Z relate total voltages and total currents at each of the two ports. Their determination requires application of open and short circuits to the network ports. At lower frequencies, construction of these terminations is no problem, but at microwaves any realizable physical open or short circuit can only be placed a significant proportion of a wavelength from the device if measurements are to be taken, and this proportion then becomes frequency-dependent. It is also not so easy to measure voltages or currents without introducing some kind of transmission line between device and measuring point, which results in transformation of the values obtained. A further point is the susceptibility of high frequency active devices to instability when presented with extreme values of source or load impedance.

These difficulties can be overcome by defining a new set of network parameters which relate values of incident and reflected traveling waves. These parameters are effectively reflection coefficients and are termed S- (for scattering) Parameters. Measurement of S-Parameters involves terminating one of the network's ports in the characteristic impedance of the transmission line used (a simple matter since the line can now be of any length) and measuring as a vector quantity the reflection coefficient looking into the other port and the transmission coefficient through the network. Repeating this in the other direction gives us the four S-parameters:

- S_{11}, the input reflection coefficient
- S_{21}, the forward transmission coefficient
- S_{22}, the output reflection coefficient
- S_{12}, the reverse transmission coefficient.

These values can readily be measured using a network analyzer, with the 2-port (transistor in our case) in a suitable transmission-line mount with provision for biasing. To characterise the transistor fully these parameters must be measured at a series of frequencies across the band of interest, and also at out-of-band frequencies (to ensure an amplifier will not exhibit an unexpected out-of-band instability), and for a range of bias conditions. Transistor manufacturers publish typical values of the S-Parameters either in tabular form or plotted on the Smith chart.

In addition to the S-Parameters of his chosen device, the low-noise amplifier designer need to know its noise parameters. At each frequency and bias condition, three figures are required:

- F_{min}, the minimum noise figure (usually expressed in dB)
- r_n, the normalized equivalent noise resistance ($= \frac{R_n}{50}$, in a 50-ohm system)
- and Γ_o, the optimum source reflection coefficient, i.e. that at which the transistor noise figure is F_{min}.

It now apparent at what bias conditions the transistor gives its mimimum noise figure, at the frequency of interest. By reference to the S-parameters for this bias condition and frequency, the designer can calculate the associated gain G_a of his transistor. At this point he may wish to adjust his bias point to gain the best compromise between gain and noise figure, bearing in mind that in a practical amplifier the second stage will at best have a noise figure as good as that of the first. Typically it will be less good. A useful concept here is noise measure, M_{min}, being the system noise figure of an infinite cascaded chain of identical amplifier stages. M_{min} is expressed as

$$10 \log \left(1 + \frac{F_{min} - 1}{1 - \frac{1}{G_a}}\right)$$

M_{min} in dB, F_{min} and G_a as power ratios.

From this point on, CAD (Computer-Aided Design) takes over. To evaluate all the constants and variables and


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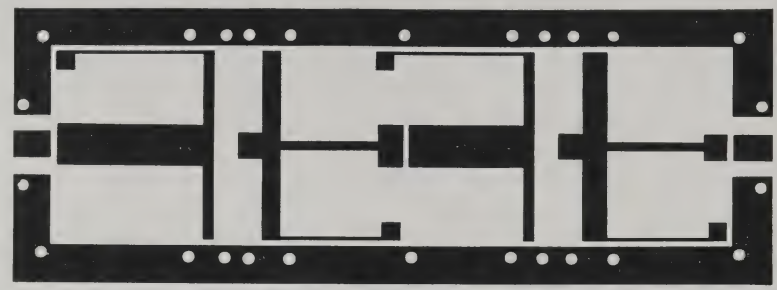


PATTERN FOR ETCHING UPPER SURFACE OF LNA MICROSTRIP BOARD.
LOWER SURFACE OF BOARD TO BE PLAIN COPPER.
THIS MAY BE REDUCED BY A FACTOR OF TWO FOR PHOTO-ETCHING.

DIAGRAM 1

generate a matching topography, trading off as required noise, gain and stability, is tedious work for the designer equipped with Smith chart and calculator, and must consider one frequency at a time. To produce a broad-band design with sensibly constant values of gain and noise figure across 500 MHz or more at 4 GHz, today's designer will use one of the programs written for this purpose, its print-out detailing the series and shunt transmission lines and stubs required to interface the transistor to the real 50-ohm world, while realizing the best of its potential.

The solution suggested by the computer is not the only possible answer to the problem, and often is not the best. The computer-designed matching networks are adjusted in the development lab to optimize performance. It may be necessary to alter certain of the constants in the outline design and run the program again before a realizable and reproducible circuit is obtained, and even having done so, production amplifiers still need individual adjustment on the test bench to give of their best in noise figure and gain flatness.

The basics of microwave transistor circuit design using S-Parameters are explained with great clarity in Hewlett Packard's Application Note 154, 'S-Parameter Design', which is a transcription of that company's videotape 'S-Parameter Design Seminar'.

CIRCUIT DETAILS

This circuit is based on the design published in H-P Application Note 967 'A Low Noise 4 GHz Transistor Amplifier using the HXTR-6101 Silicon Bipolar Transistor'. Two stages have been incorporated, and the matching networks adjusted on test to optimize performance over the band. The first stage transistor, HXTR-6102, is, a selected specimen of the HXTR-6101, having a typical F_{min} at 4 GHz of 2.5 dB as against 2.8 dB for the –6101. Corresponding M_{min} is 2.8 dB typical compared to 3.1 dB. Both stages are biased for minimum noise measure, the regulator transistors Q3 and Q4 (Diagram 3) setting collector volts at 10V and current at 4 mA. Low-frequency instability is prevented by the 0.1 uF capacitors C16-19 on the outputs of the bias regulators. Chip capacitors were used in these positions in the prototype, but there is no reason why a standard miniature type should not be used. The circuitry in the lower half of diagram 3 is all mounted on the RF board which carries the microstripline pattern of matching elements. All the capacitors on this board are ceramic chip types. I have used capacitors of Vitramon manufacture, but similar components are available from other suppliers, including ATC, JFD, Erie, Di-Cap and Johanson. The shunt stubs are decoupled by 4.7 pF capacitors giving low impedance at 4 GHz. Feed current is supplied through high Z_0 quarter-wave lines decoupled at the supply end by 1000 pF capacitors for frequencies in the VHF and UHF range. Low-frequency roll-off is provided by the 2.2 pF coupling capacitors C1,8 and 15.

CONSTRUCTION

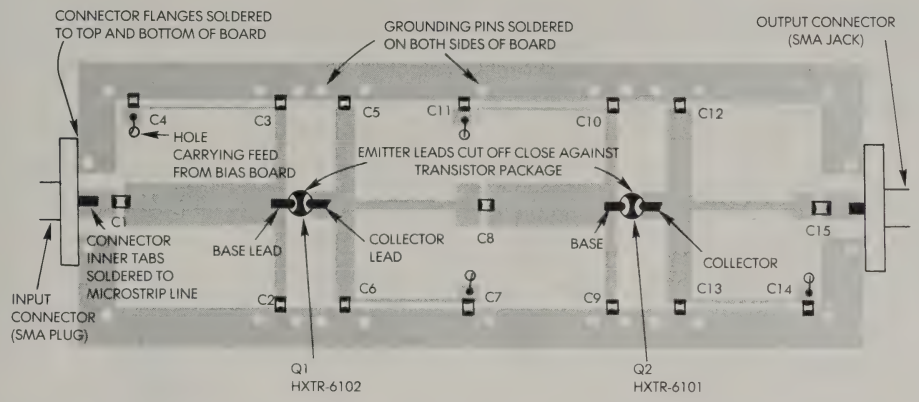
The microstrip circuitry is etched on teflon-filled glass fiber board of 0.031" (0.79mm) thickness and dielectric constant 2.5. This material has mechanical properties similar to standard epoxy fiberglass, but combined with low dielectric loss and controlled thickness and dielectric constant. Here at Real-World Technology we use Di-Clad 527 laminate from Keene Corporation, Chase-Foster Division, but similar materials are also available from 3M company and Atlantic Laminates, among others. **Diagram 1** shows the pattern to be etched on the board's top surface, the black areas representing copper track. This diagram may be photographically reduced by a factor of two and the negative used in a photoresist etching process to ensure accurate line widths. The reverse side of the board must remain copper-clad, to provide the ground plane. A grounded border is provided on the board's upper side for ease of chip capacitor mounting, and this must have low-inductance connections to the ground plane near each of the decoupling points. A series of 1mm diameter pins are used, soldered above and below the board, with excess length trimmed off. Alternatively, through-hole plating could be used if available. The edges of the board are foil-wrapped to provide continuity of grounding. Input and output connector flanges are also soldered on both sides of the board. The connectors are the gold-plated SMA microwave 3-mm coaxial series, with stripline tab inner contacts. A plug type connector was used on the input, to allow direct connection to the multi-pole feed horn described in CATJ, February 1979.

Diagram 2 shows component layout on the microstrip board. The emitter lead-outs on the HPAC-70GT package are not used, and should be cut off as close as possible to the transistor case. A 2-mm hole is drilled to mount the transistor, the thickness of which brings the emitter cap flush with the ground plane surface on the reverse side of the board, where it can be soldered around its circumference. The chip capacitors should be soldered carefully but quickly, having cleaned but not tinned the surface of the copper where they are to go. If part of the contact area has been unavoidably tinned (as may happen adjacent to the grounding pins) then that end of the capacitor should be soldered first, applying a gentle downward pressure to ensure intimate contact between chip termination and copper. Low melting-point silver-loaded tin-lead solder should ideally be used for the chip capacitor connections. A 1-mm length of this solder wire laid across the end of the capacitor, in contact with chip termination and board, is all that is required to solder these capacitors effectively—the capacitor may be held in place with a plastic probe or teflon tweezers while the first end is soldered.

A layout is not given for the bias regulator board as this is non-critical. It may take the form of a piece of

DIAGRAM 2

COMPONENT LAYOUT, TOP SIDE OF LNA RF BOARD



standard glass fiber PCB of the same length and width as the RF board, mounted below the latter on small nylon screws with spacers, thus lending its rigidity to the RF board. (Flexing should be avoided after mounting the chip capacitors, or the stress could cause them to crack.) The four interconnections (apart from ground) are made by thin wires passing through holes in the RF board and attaching to the pads adjacent to C4, 7, 11 and 14. The whole assembly can be mounted in a weatherproof box provided the direct connection of the coaxial flanges to the board is maintained. Alternatively the entire feed and LNA could be enclosed.

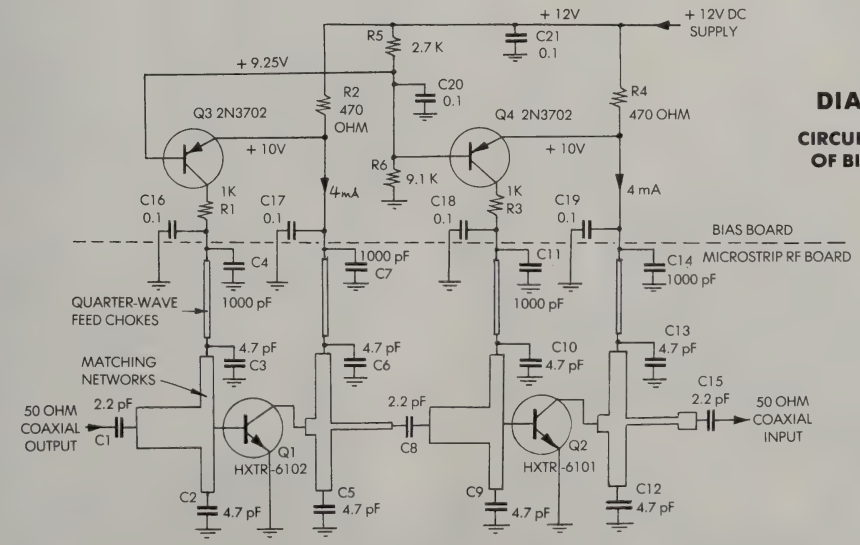
COMPONENTS LIST

Microstrip board: 62.5 x 22.5 x 0.79 mm Di-Clad 527, dielectric constant 2.5, etched as **Diagram 1.**

Transistors: Q1: HXTR-6102, Hewlett Packard
Q2: HXTR-6101, Hewlett Packard
Q3,4: 2N3702 or similar, Texas etc.

DIAGRAM 3

CIRCUIT SCHEMATIC OF BIPOLAR LNA



Question 1

Which type of Pay-TV security is the least expensive... Positive or Negative?

The following simple formula can be used in estimating the relative costs of positive vs. negative security:

(BPD+H) – B (1-P) T = S

Where:

B = No. of basic subscribers
P = Pay penetration of basic subscribers
D = Unit cost of a descrambler or decoder
H = Cost of head-end equipment
T = Unit cost of Vitek's trap
S = Savings

Typical example using approximate values:

Where:

B = 1000 (1000 subscriber system)

P = 35.4% (national average pay-penetration according to the latest Paul Kagan Associates census-Dec. 31, 1978)

D = $9.75 (approx. cost of low-band decoder)

H = $500 (approx. cost of head-end equipment for low-band decoder)

T = $5.00 (approx. average cost for Vitek's single-channel trap.

Using these values applied to the formula as follows:

(1000 x .354% x 9.75 + 500) - 1000 x .646 x 5 = S

3951.50 - 3230 = 721.50

The example shows that a savings of $721.50 would be realized in choosing Vitek's negative traps instead of the positive device. Note that more expensive decoders or descramblers would result in greater savings.

The "4" Most Important Questions You Should Ask Before Choosing Your Pay-TV Security.

Question 2

Which type of Pay-TV security is the most secure?

Pay-TV security that is outside the home and on the pole. Any picture brought into the home can be reconstituted. By using Vitek traps on the pole, this risk is eliminated. There is the added advantage, with Vitek's cable traps, of having a low-security profile.

Question 3

Which type of PAY-TV security allows for almost any number of premium channels and/or tiers of service.

Vitek's multi-channel traps gives every system operator the opportunity to market his product in almost any combination of channels and/or blocks of channels. Vitek's band-reject traps allows the system operator to trap out most of the mid-band (channels A thru G), the super-band (channels L thru W) or in a combination of both mid-band and super-band in one trap (channels A thru G plus L thru W).

Question 4

Which type of Pay-TV security has no affect on the signal-noise ratio?

Vitek's traps have absolutely no affect on the signal to noise ratio. The traps are passive and they are installed in-line only for those subscribers *not receiving* the premium channel.

Now, when you ask those 4 important questions . . . what's your answer going to be?

If you still have any unresolved questions, call or write:

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R2,4 - 470 ohm, 5%
R5 - 2.7K 5%
R6 - 9.1K 5%

Capacitors: C1,8,15 - 2.2 pF, Vitramon VJ0805A2R2DF
C2,3,5,6,9,10,12,13 - 4.7 pF, Vitramon VJ0805A4R7DF
C4,7,11,14 - 1000 pF, Vitramon VJ0805X102KF
C16,17,18,19 - 0.1 microfarad, Vitramon VJ1808X104KF or low-voltage disc ceramic.

Connectors: Input SMA plug receptacle, tab contact, flush dielectric, Sealectro type 50-646-4575-31 (gold plated) or similar.
Output SMA jack receptacle, tab contact, flush dielectric, Sealectro type 50-645-4575-31 (gold plated) or similar.

Note: SMA connectors from different manufacturers may be known variously as SMA, SRM, RIM, or OSM series.

VARIATIONS

HXTR-6101 could be used in both stages. This will degrade noise figure typically by 0.3 dB. HXTR-6102 could be used in both stages but little benefit will accrue and the 6102 is more costly than the 6101.

A laminate of different dielectric constant could be used, but if outside the range 2.3 to 2.7, alteration of the etching pattern will be required.

A supply of other than 12V could be used. With suitable adjustment of resistor values on bias regulator, circuit will operate from any supply voltage between 12 and 30V.

Bias conditions could be changed. Adjustment of R5/R6 ratio will change collector voltage. Adjustment of R2 and R4 will vary currents. There may be some advantage to be gained in increasing Q2 collector current to 5 mA, where the slight increase in gain might offset noise increase, depending on following stage characteristics.

A ferrite isolator could be incorporated between feed antenna and LNA. This would accurately define source impedance seen by Q1, but would introduce some 0.3 dB loss.

REAL-WORLD TECHNOLOGY

Due to circumstances beyond our control, R-WT has been unable to enter the US LNA market as intended. Our apologies to those who have written for specifications or catalogs—I think you will find American-made amplifiers considerably easier to obtain than they were towards the end of 1978.

FEEDBACK

The folks at CATJ in Oklahoma City ensure me this column has an avid readership—I have had little sign of it. I would welcome letters from any TVRO experimenter, professional or amateur, with experiences to relate, suggestions to make, or problems to solve. But please note a stamped addressed envelope doesn't help—US postage stamps have no value in England. A dollar bill will ensure a reply by air mail. Also note surface mail can take three months—air mail arrives within the week.

COMING SOON

A single-stage GaAsFET LNA. This design uses Plessey's GAT 5 (no-one else has sent me samples, and even Plessey seem to be finding it difficult to make the GAT-6, their half-micron gate length device.)

Ray Daly on Computers In Cable

Ray Daly, President
Computer Cablevision, Inc.
2617 42nd St. NW
Washington, D.C. 20007

The two-edged sword of microcomputers is becoming apparent to many cable television technical personnel, managers and owners. While the potential uses abound, microcomputers are threatening cable television. The way systems are evaluated is threatened. The lack of programs for cable television threatens this industry. Microcomputers threaten the present methods of electronic design. And the competition will use microcomputers to threaten the industry. The impact of microcomputers could be as much or more than the impact of satellite distribution if the challenges are met.

The problem is the computer. No, they're not expensive any more. That may be part of the problem. No, they're not difficult to use. And that may be part of the problem. And no, they're not unreliable. And this too may be part of the problem. But they do pose a threat.

THREAT TO PRESENT WAY OF EVALUATING BUSINESS

The advance of electronics has brought a variety of marvels. The introduction of satellites to cable television by Home Box Office and RCA threatened the previous ways of doing business in the industry. Now it is standard procedure to consider satellite reception as part of **any** cable television system. Regardless of whether an earth terminal for receiving satellite signals is already used in the plant, **the value of the system** is affected by this technology.

With microcomputers the previous ways of doing business are likewise threatened. Just as most technical personnel may have thought that HBO's decision to distribute via satellite would never effect them or their cable system, the same is probably true about how you think about microcomputers and cable television.

Cable television is in the forefront of satellite distribution. Now public television, radio networks, and some broadcast television syndicators are joining in. And broadcast television networks are not far behind. But, the people in this industry have kept pace with the developments in this technology and this has produced results.

THREAT OF COMPUTER SOFTWARE

With microcomputers it appears that several people are also concerned. Many are so concerned that they have spent their own hard earned money to buy a microcomputer. Several small systems have purchased them. And some of the larger companies either have purchased or are considering purchase of microcomputers for their personnel.

Articles in the trade press, like this column "On Computers" and occasional other papers support computer users. Each column I try to present a program which helps solve a cable television problem. To date these programs include: "Geostationary

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2. Geostationary Satellite Finder II by Ray Daly
   Level II 4k
3. Cable Power System Design by Daly and Bill Marshall
   Level I or II 4k
4. Feeder Design by Daly and Marshall
   Level I or II 4k
5. (please fill this spot with **your** program)

Category Two (for TRS-80)

1. **Renumbering and Merge** from Software Associates
   Level II 16k $14.95
2. **Library 100** from Bottom Shelf, Inc.
   100 different programs; 25 business and finance
   Level II 4k $49.95
3. **Electric Pencil** from Michael Shayer Software
   word processing
   Level I or II 16k $99.95
4. **Business I** from Neal Jensen
   very small business programs
   Level I or II 4k $9.95
5. **Business II** from Neal Jensen
   very small business programs
   Level I or II 4k $9.95
6. **EDITOR** from Software Associates
   disk word processing
   DOS 32k $39.95
7. **Electronics I** from Instant Software
   Tuned Circuits & Coil Windings, 555 Timer Circuits,
   LM 381 Pre-Amp Design
   4k Level I 16k Level II $7.95
8. **Ham Package I** from Instant Software
   Basic Electronic Formulas with Voltage Divider,
   with R/C time Constants, Dipole and Yagi Antennas
   4k Level I 16k Level II $7.95
9. **Business Package I** from Instant Software
   Keep books for small business.
   4k Level I only $29.95
10. **Video Pager** from Computer Cablevision
    described in March 1979 CATJ
    Level I or Level II $19.95
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To order any program write to Computer Cablevision, Inc; 2617 42nd St NW #2; Washington, DC 20007.
Or phone (202) 337-4691. Please add $1.00 for shipping.

Note: By submitting a program for the "Exchange" in Category One you can receive any three programs at no cost. Please submit programs with written instructions for other users.

Satellite Finder", "Cable Power Design", "Feeder Design", and "Coordinate Distance Calculation" (see below). Users of microcomputers are supporting this effort by contributing programs. And I thank them.

But most owners of microcomputers are searching for more programs. Like I said in the opening, the problem is the computer. It is fairly inexpensive to purchase, operate, and maintain. It almost seems **too easy** to do!

But this is part of the threat. The computer is deceiving because it is only half there. The other half is the computer program. Besides articles in the trade press, there are few other places to turn for programs. **This is the threat** which may impede the development of microcomputers in this field.

No computer manufacturer is going to offer cable television software to this industry. **The industry must develop the programs itself.** Manufacturers have much to gain. They could offer programs which show how to simply design plant with **their** equipment. Or how certain equipment operates. Or how to properly adjust equipment. Both educational and useful programs are necessary.

Microwave and satellite earth station suppliers have much to gain by providing microcomputer programs. Designing and planning either type of station requires a variety of calculations to be performed. While programmable calculators can do some functions, microcomputers provide a better means to both explain the necessity of the calculation and make the computation. One company has an excellent program on a programmable calculator comparing the cost of various earth station equipment. Such a program on a microcomputer would be even more effective and would interest many owners.

An opportunity exists for any company or individual in the microcomputer field. An important part of any business is to be recognized as a leader in the field. With an excellent program, any manufacturer or person can easily gain an excellent reputation. For years they could be recognized as having the best program and this can add to their success.

THREAT TO ELECTRONIC DESIGN

Cable television is a vital part of the electronics industry. And as any casual observer knows the field advances quite rapidly. This industry is a leader in both satellite communications and optical fibers. Such new technology requires both the technician and engineer to constantly learn about new developments.

In electronics the vacuum tube was once king. With the advent of the transistor, tubes are used very little. And now integrated circuits, sometimes known as black boxes, are replacing transistors. But the most

fundamental change is the microprocessor.

The microprocessor is part of the threat. Without the microprocessor, small computers like the Radio Shack TRS-80 would be impossible. They can substantially reduce the costs and size of electronics packages. They make the design of electronic products dependent on programs and very little on test circuits and soldering. This changes the way of doing "business" for most engineers and technicians.

For example, Cliff Schrock recently wrote an article about his "Blue Sky Box" in "Communications-Engineering Digest". "Security, Energy and Pay-Per-View", describes an elegant, flexible and relatively low-cost method of providing auxiliary services on a cable television system. Cliff states that "the real breakthrough in design cost and flexibility came with introduction of the single chip microprocessor". And all special services will be digital.

COMPETITION WILL ATTACK WITH MICROCOMPUTERS

And this is a threat. Unless an engineer or technician has an appreciation for microcomputers, it would be very difficult for them to make such necessary services available on their system. For the industry to continue its progress technical personnel and owners must become aware of the microcomputer and its implications.

With the assistance of General Instruments, the parent company of Jerrold Electronics, Matel Electronics, better known for their games recently introduced their limited microcomputer called **Intellivision.** (What is television now—**stupidvision**?) There was much speculation in 1978 that Jerrold was going to introduce such a microcomputer to mate with cable television systems. Such a device is necessary.

In Europe, and on an experimental basis in the United States, the vertical blanking interval is being programmed. More information is being provided with that brief "time" in the television transmission than is available in most daily newspapers. It makes many "data" services provided on cable systems look amateurish. While it does require a special home decoder, its cost should be quite low when mass produced for millions of U.S. television homes. **This too is a use of microcomputers.**

Several companies, including Digital Broadcasting in McLean, Virginia, and the Digicast Project in California, are offering or planning to offer computer services to consumers using broadcast facilities. It appears that if cable can not offer such "blue sky" services, the entrepreneurs are approaching broadcasters. The competition with broadcasters remains.

Microcomputers effect the future development of cable television. First, they threaten the present way of evaluating a cable television system, and technical personnel should be aware of this. Second, there is currently a lack of programs in the cable television field which threatens microcomputer development and provides an opportunity for companies and individuals. Third, it is important that microcomputers are understood because many new advances in electronics have them at the heart of their design. And fourth, the competition in this electronics industry is already starting to provide digital auxiliary services which has important consequences for cable television. In order to compete, technical personnel, managers, and owners must understand microcomputers.

Coordinate Distance Calculation

```
100 REM  THIS PROGRAM WILL COMPUTE DISTANCE AND AZIMUTH
110 REM GIVEN LONGITUDE AND LATITUDE OF TWO POINTS
120 REM  FORMATTED FOR TRS - 80 16K LEVEL II
130 REM  LEW STROCK - ANTIETAM CABLE TELEVISION
140 REM                    HAGERSTOWN, MARYLAND
150 REM  UPDATE: FORMAT AND DISPLAY 02/24/79
160 REM
170 REM  DIMENSION STRINGS AND DEFINE DOUBLE PRECISION
180 DIM A$ (100), B$ (100)
190 DEFDBL A-L
200 REM  CLEAR SCREEN AND GET XMTR SITE NAME AND LOCATION
210 CLS: PRINT TAB (15) "D I S T A N C E / A Z I M U T H": PRINT
220 INPUT "TRANSMITTER LOCATION                ";A$
230 REM  CONVERT DEGREES - MINUTES - SECONDS TO ONE NUMBER
240 INPUT "TRANSMITTER LATITUDE - D,M,S ";D,M,S
250 L1=D+ (M+(S/60) ) / 60
280 REM  GET RCVR SITE NAME AND LOCATION
290 PRINT
300 INPUT "RECEIVER LOCATION          ";B$
310 INPUT "RECEIVER LATITUDE - D,M,S ";D,M,S
320 L3=D+ ( M F+ (S/60) ) / 60
330 INPUT "RECEIVER LONGITUDE - D,M,S" ;D,M,S
340 L4=D + (M + (S/60) / 60
350 REM FIND ANGLES A – B – C AND CONVERT TO RADIANS
360 A = L2 – L4 : A = A * .0174532925
370 B = 90 – L1 : B = B * .0174532925
380 C = 90 – L3 : C = C * .0174532925
390 REM COMPUTE DISTANCE AND AZIMUTH USING TRIG
400 E = COS (B) * COS (C) + SIN (B) * SIN (C) * COS (A)
410 F=ATN (SQR (ABS (1-E[2) ) / E)
420 G=(COS(C) - COS(F) ' COS (B) ) /(SIN(F) * SIN (B) )
430 H=ATN (SQR (ABS (1-G[2) ) / G)
440 REM  CONVERT H BACK TO DEREES
450 H=H*57.2957795785523
460 IF H>=0 THEN 490
470 H=H+ 180
480 REM  CONVERT F BACK TO DEGREES
490 F=F * 57.2957795785523
500 REM  FIND DISTANCE BY KNOWN DISTANCE SCALE OF CO-ORD
510 I=F 69.05
520 J=SIN (A)
530 REM  CONVERT J BACK TO DEGREES
540 J=J *57.2957795785523
550 REM  DISPLAY RESULTS OF COMPUTATIONS
560 PRINT : PRINT A$; " TO"; B$ : PRINT
570 PRINT "DISTANCE="; USING "###.##" ; I ;: PRINT "MILES";
580 IF J>0 THEN 600
590 H= 360 - H
600 PRINT "
610 PRINT "AZIMUTH="; USING "###.##" ; H ;: PRINT "DEGREES"
620 PRINT
630 REM  GO BACK TO GET OTHER POINTS SERVED BY XMTR
640 REM  OR START OVER WITH A NEW XMTR SITE
650 Q$="" ' RESET Q$
660 INPUT "ENTER AN X TO CONTINUE USING THE SAME XMTR SITE"; Q$
670 IF Q$="X" THEN PRINT@ 320,; : PRINT CHR$(31) : GOTO 300
680 GOTO 200
690 END
```

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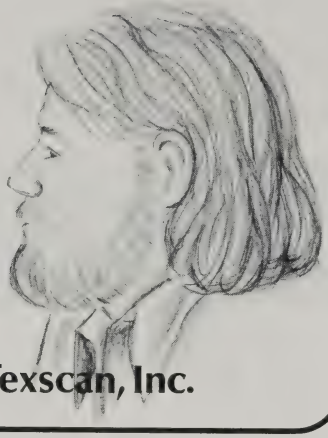
R. Stelle's Technology Corner



Raleigh B. Stelle - Texscan, Inc.

Last month I began my "Bench" series with the VOM and it's characteristics as regards current. This month I'll try to discuss the volts and ohms section of the VOM.

The DC voltage scales are determined by series resistors called multipliers. In last months examples we used a 100 micro amp movement with 100 ohm internal resistance so let's continue that.

Since it requires 100 micro amp to make full scale deflection, we can adjust current flow for a given voltage by adjusting the total (series) resistance of the circuit. For example:

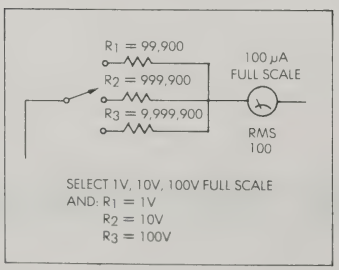
$I = 100 \times 10_{-6}$ A
E = 1 (volt full scale)

$$R_1 = \frac{E}{100 \times 10^{-6}} = \frac{1}{10^2} = \frac{10^6}{10^2} = 10^4 =$$

10K − 100 ohm = 99,900

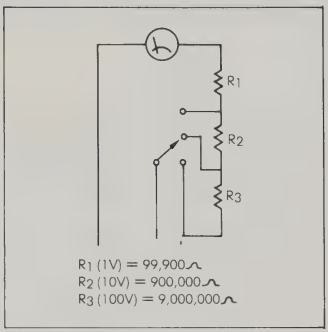
$$R_2 = \frac{10}{100 \times 10^{-6}} = 10^5 - 100$$

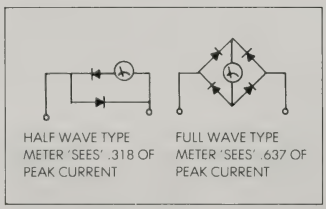
$$R_3 = \frac{100}{100 \times 10^{-6}} = 10^6 - 100$$



This multiplier circuit could also be constructed as follows:

Here are a few precautions to be taken in the use of the Voltmeter. **Always** connect the voltmeter **in parallel with** the element being measured, NOT IN SERIES. **Proper polarity** must be observed, with **the negative lead** connected **to the lowest circuit potential** and the **positive lead** to the **highest potential.** If scale selections are incorrect, physical and electrical damage may result, so **start with high voltage ranges and work down.**



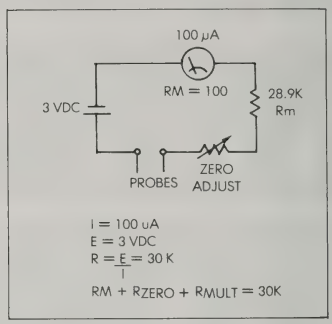


The **AC Voltmeter** is an animal of spotty stripes. It **should** be a straightforward beast, but is instead usually very confusing.

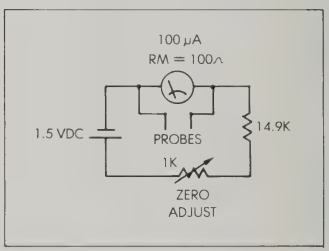
The circuit below is the usual AC meter circuit, although iron vane measurement with accuracies of 5% or better may be utilized.

The diodes used may range from copper oxide to selenium to point contact and even transistor junctions.

Since the meter movement responds to **AVERAGE CURRENT,** and average current is not a usual measure of equivalence, most meters are AVERAGE detecting, RMS READING. That is, they are calibrated to read in terms of an **equivalent RMS voltage** which is **.707 of peak voltage** as opposed to .637



which is the average value of a sine wave. In cable however, we have the problem that our **system voltages** are **semi-square wave.** If the waveform were **perfectly square,** the **average** value would be 100% of **peak** and RMS = peak. So you can see that the **average** value of a square wave is more than a similar sine wave by some 36%. You can always expect your **sine wave VOM** to read **square wave supplies** about 36% **high.** If this is confusing, how about peak detecting, 'Quasi RMS Indicating'—if you believe that last line, I've got some land in Arizona.



Finally we get to good old Dr. ohm measurements of resistance. Resistance measurement is nothing more than a special case of voltage measurement wherein the voltage is self contained (batteries). There are two types of multipler schemes which we commonly used, series multipliers and shunt multipliers. Each has it's particular application.

Note that **0 ohms** is **maximum current** on the meter scale and open circuit (infinite resistance) is **no current flow** so "0" ohms will be on the right side of the meter movement with infinity to the left and with increasing resistance values from right to left. Half scale deflection would require:

$$50 \text{ Micro Amp} = I \quad E = 3 \text{ V} \quad R = \frac{3}{50 \times 10^{-6}} =$$

$$\frac{3 \times 10^6}{50} = 60{,}000 \text{ ohm}$$

TOTAL RESISTANCE

Don't buy any drop cable that doesn't pass this test

1. Using a micrometer, measure the overall outside diameter of the cable. If it is not .242″, connectors will not fit, allowing moisture to enter through loose fittings.

2. Use a sharp knife or razor blade to carefully cut along the length of the jacket for a foot, then pull the jacket away. If cable is braided, be careful not to nick the braid. If you ordered 67% braid, see if 2/3 of the foil is covered by braid—not 1/2 or less.

3. Gently remove braid and foil from core. Measure core at several places to make sure it is .146″—not .136″ or .142″. Again, if not, connectors will not fit properly. It will also not be 75 ohm cable.

4. Use a stripper or knife and remove a couple of inches of dielectric. If it sticks, installers will have to scrape conductor, which may damage performance. If the fuzz is not stripped, you will have a poor signal due to a bad connection.

5. Are standard connectors available from the connector manufacturer? Some drop cable is so undersize that special connectors are required.

6. Take a piece of new cable and flex it back and forth a few times. Strip jacket off to expose foil shield. If it is cracked or flaked, you will probably have signal leaks in your systems.

7. On messengered cable, make sure the messenger separates without tearing jacket down to the cable.

8. Read the supplier's catalog. Is the cable 100% sweep tested over the entire 5-300 mhz range? It should be.

9. Check the put-up. Does it seem like it would be easy to carry from job to job?* Does the cable come in odd ball lengths that might result in greater scrap?

10. Count your callbacks over the last six months. If any were due to bad drop cable connections or faulty cable performance, run this test again using a variety of samples.

Our engineers tell us that much of the drop cable on the market today does not live up to stated claims. While this trend naturally results in "cheap" drop cable, it can lead to expensive consequences for you in the form of subscriber complaints, callbacks, and generally poor cable performance later on. To help you determine exactly what you are getting, we devised the simple ten step test above.

If your cable doesn't pass the test with flying colors, please give us a call. If for some reason you can't run the test, send samples to us and our engineers will run the test and supply you with full documentation. We just want to make sure that you get what you pay for. Belden Corporation, Electronic Division, P.O. Box 1327, Richmond, IN 47374; 317-966-6661.

*It should be noted that Belden pioneered the innovative UNREEL® wire dispenser, and recently introduced the handy UNREEL Sling.

BELDEN

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8-13-9

Printed in U.S.A.

Since 30 K is an internal resistance, half scale indicates 30 K resistance. Different scales are achieved by different internal battery voltages.

Low values of resistance can be measured most accurately on a **shunt type** ohmmeter.

In this case the "0" point is at the **left portion** of the scale and **maximum resistance** is on the **right.** Example: If 100 ohms is connected **in shunt with** the meter only 50 micro amp will flow and half scale will be 100 ohm.

Meter precaution—it is very easy to damage a sensitive ohmmeter by connecting it **across a voltage source.** Be sure that any circuit element to be measured has **no voltage across it.** Particularly disastrous is a fully charged electrolytic capacitor. The capacitor can easily produce enough current to destroy the meter movement.

There are other types of meters such as the bridge meters, meggers, and the Wattmeter, but these are usually not found on the simple bench. They are the tools of advanced measurements.

Next month we'll take a look at the oscilloscope.

One Man's View of the NCTA '79 in Las Vegas

The fun really began a year ago, just after Frank Masters' cheery voice said, "See you all in St. Louis!" Rumors began flying around the industry that the NCTA would ruin their show when they changed it from St. Louis to Las Vegas. This caused no end of problems, particulary among the vendors, who either shrugged philosophically or predicted **vast** expenditures for a show in Vegas with very little business activity. It actually worked out to be the "good news—bad news" story. It was expensive!!! Very expensive, but the show attendance was announced as being 6350, and those were active buyers.

The "usual" NCTA vendors sees all of the attendees making casual rounds of the exhibits, window shopping, on the first day of the convention. After the casual once over, the attendees will zero-in on the few booths and vendors with whom he intends to do comparisons or actually negotiate business.

This year seemed **much** different!! Many good customers and friends didn't make it to the booth until the second or third day, and business was **brisk** from the opening gun to closing curtain. What caused this change from the norm?

Continued on Page 64

Five new services from SSS

Five new cable origination program services on the satellite:

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Alaskan TV Format

The State of Alaska has been providing a special television service to several dozen 'Bush Terminal' TVRO sites for several years now and the system utilized for this system is substantially different from the 'full transponder format' in use for the 'lower 48'.

Originally RCA Americom provided television signal feeds from both Los Angeles (South Mountain) and Philadelphia (Vernon Valley). A program schedule developed in Anchorage was picked off-the-air at South Mountain (and off of a cable system feed at Vernon Valley), sent via either conventional format (36 MHz wide channel, 6.8 MHz sub-carrier audio) to Anchorage, or, via a 1/2 transponder format (see table and diagrams here) by which two separate TV signals could be grouped within a standard 36/40 MHz wide channel. In Anchorage the programs received were videotaped for two reasons; by taping the programs they could be arranged into a 'schedule' to suit the Alaskan program managers, and editing changes could be made in the received programming.

Alaskan Bush Terminals usually do double duty as both television receiving (and re-transmitting) sites, and as SCPC (audio) transmit **and** receive sites. The typical Bush Terminal installation utilizes a 4.5 meter dish and when the terminals were initially planned and installed cautious engineers felt these terminals would be too small to produce high quality television service. To compensate for this anticipated shortcoming, they designed a special 'Bush Format' video system in which the video is reduced to 8 MHz deviation (from a standard 10.75 MHz deviation) and the audio is separated off to an entirely different transponder and carried as an SCPC (single carrier per channel) signal; with 8 kHz bandwidth. By reducing the IF bandwidth of the receivers in the Bush Terminal sites (from 36 to 20 MHz) the system picks up in theory around 2 dB C/N. However, when the transmitting deviation is also reduced (note 8 MHz versus 10.75 MHz) the 'FM advantage' goes down so the actual net gain is very small if indeed any at all.

Recapturing (i.e. receiving) the 'to-Alaska' signal in the 1/2 transponder format requires a TVRO receiver that has 17.5 MHz IF filtering and some means for adjusting the high local oscillator (LO) to result in a 4169.5 or 4150.5 MHz **center frequency** being fed into the center of the IF range. Some receivers have 'tuning steps' of 0.25 MHz which allow the user to move the LO into the proper range. Other receivers are simply 'fixed tuned' to the **center** of each of the 'standard' transponders and they cannot be walked into the appropriate (offset) spot to receive the 1/2 transponder signals. The audio is carried on a totally separate transponder (see diagram); typically the video goes to Alaska on (vertical) transponder 23 while the audio goes on (vertical) transponder 3 (see specifications table).

To recapture the (later in the day) Bush Terminal format signal requires less in the way of special equipment. The video has a normal (to the transponder) center frequency; 4160 MHz in the case of transponder 23. However the deviation is down (reduced), the receiver IF is in turn reduced. The big recapture problem is the audio; it, like the 1/2 transponder format, is carried on a separate transponder. Oh well, there is always the radio!

Not all television sent to Anchorage on vertical transponder 23 is in the 1/2 transponder format; from time to time you will find standard format TV there along with standard (6.8 MHz subcarrier) audio. You are also likely to on occasion find TV feeds to Anchorage, during the normal 'lower 48 broadcasting day', on other (F2) transponders; also on standard format video/audio.

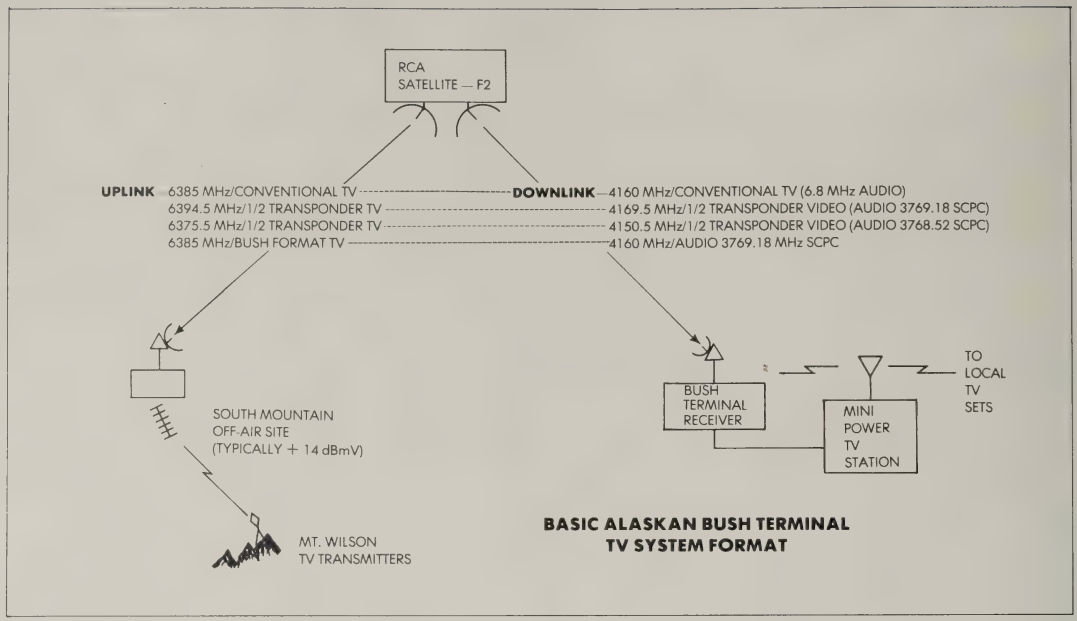
However, for now at least the TV going back out to the Bush Format terminals remains in a non-standard form and it is also shifted in time because a good deal of Alaska is two or three hours **west** of Los Angeles. The tape delay in Anchorage allows native Alaskans living in the western reaches of the state to receive television during local-normal viewing hours just like other American residents. Only in this case it may be delayed from its original

ALASKAN SATELLITE TV SYSTEM SPECIFICATIONS

Format	Frequency	Deviation (video)	Energy Dispersal	IF Filter	Audio Source
1/2 Transponder (channel 'A')	4169.5 MHz center	5.6 MHz	.7 MHz p-p	17.5 MHz	3769.180 MHz SCPC 8 kHz
1/2 Transponder (channel 'B')	4150.5 MHz center	5.6 MHz	.7 MHz p-p	17.5 MHz	3768.520 MHz SCPC 8 kHz
Bush Format	4160 MHz center	8 MHz	1.2 MHz p-p	20 MHz	3769.180 MHz SCPC 8 kHz
Conventional Format	4160 MHz center	10.75 MHz	1.2 MHz p-p	36 MHz	standard 6.8 MHz aural sub-carrier

Note: Frequencies given for video center is for transponder 23 (vertical), in use for both 1/2 transponder feeds into Anchorage and Bush Format feeds out of Anchorage to Bush Terminals.

Superfit™ for a King



BASIC ALASKAN BUSH TERMINAL TV SYSTEM FORMAT

east coast air time by as much as 7 hours.

The Bush Format terminals feed baseband video and audio into low power (typically 5, 10 or 100 watt) transmitters operating on normal VHF channels. The communities served tend to be small and tightly grouped together so very low power is required to serve the surrounding homes. The program is largely sponsored (i.e. paid for) by state funds from the State of Alaska.

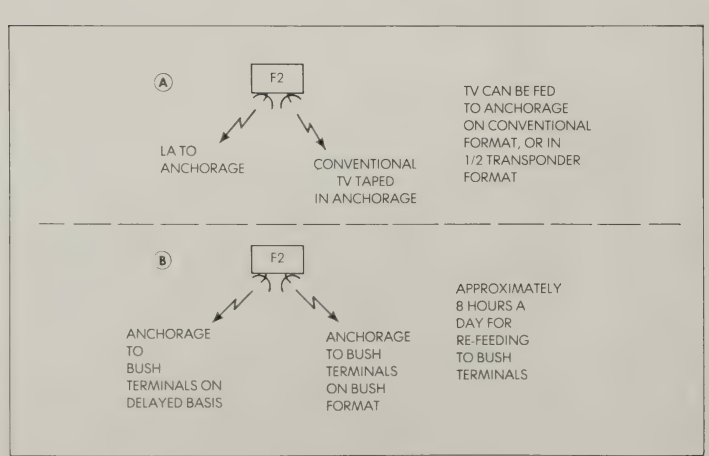
Too Many Subs?

Each time a satellite uplink transmitter adds an additional sub-carrier to the uplink transponder bound signal the total power available through the transponder must be shared by yet another 'carrier signal'. Because there is **a maximum** 'carrier-power-**sum**' of signals passing through a transponder at any given instant, each time a sub-carrier is added to the transponder population of carriers and sub-carriers the amount of power available for each individual carrier or sub-carrier must decrease. The cable receive terminal can measure this reduced power through the transponder as a direct reduction in the carrier to noise ratio (so-called C/N) he has available on the primary (video) carrier passed by the transponder.

The most 'loaded' transponder at the present time, under full time circumstances, **is transponder six on F1** where the WTCG carrier plus 6.8 MHz (aural) sub-carrier shares the available transponer EIRP with two additional sub-carriers; one in use for UPI slow-scan video (6.2 MHz) and another in use for the accompanying audio to the UPI service (7.4 MHz). See Satellite Technology News for December 1978.

Exact 'before and after' measurements are difficult because of a host of variables present. However most satellite system engineers appear to agree that **each time** a sub-carrier **is added** to the basic main-carrier plus one sub-carrier format, **the carrier level of the main-carrier drops by between 0.75 and 1.0 dB.** This suggests that the addition of the UPI **pair** of sub-carriers to the WTCG signal has brought the WTCG video carrier level **down between 1.5 and 2.0 dB** across North America. The main carrier level reduction is due of course to the transponder power amplifier being 'shared' with an additional carrier or carriers; each of which must consume some portion of the available TWT transmit function power.

Some systems surveyed by CATJ have reported that they **feel** their WTCG service has 'degraded somewhat' since the introduction of the UPI sub-carriers this past July. Others say they have not been able to detect (perhaps as opposed to measure) any difference in signal quality. For a system that was **right at** the 3.0 dB 'margin' **before** the sub-carriers were added the range of drop expected (1.5 to 2.0 dB) could bring them down to a point where only minor changes in path propagation 'loss' or equipment performance would lower their carrier to



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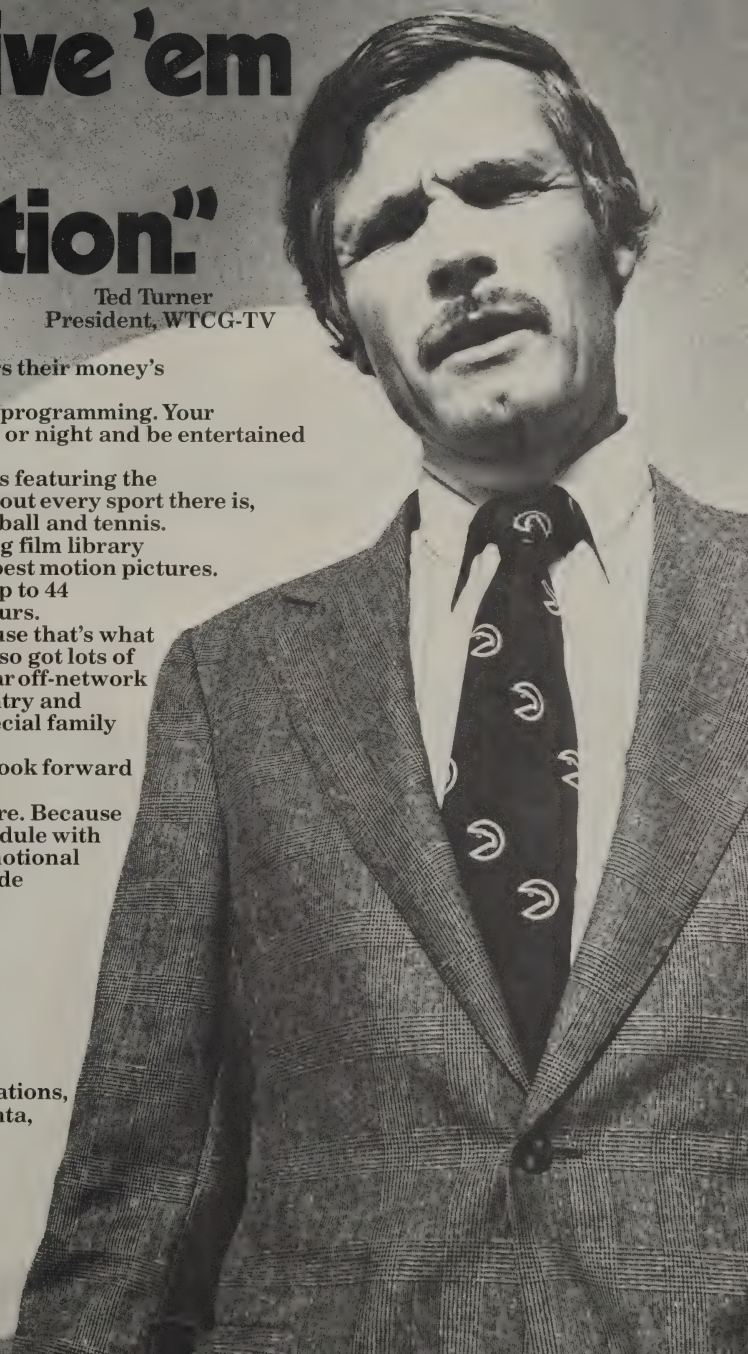
President, WTCG-TV



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THREE meter (10 foot) 12 petal polar mounted TVRO antenna from Anixter.

the receive system threshold. For systems with 'excessive' margins, such as 5 dB, the 1.5 to 2.0 dB carrier drop might not in fact be noticeable.

As the cable industry continues to grow and as auxiliary services become more common (many of which may employ sub-carrier transmission techniques) the 'temptation' to add more and more sub-carriers to a basic transponder will be considerable. The first to feel the carrier to noise pinch will be those systems that are at (or below) the 3.0 dB margin to begin with. This suggests that before a transponder operator rushes into the addition of sub-carrier 'renters' to his uplink service he might be well advised to check just how good the margin really is with the bulk of his high dollar paying customers. It may well be that for many of his cable system customers one sub-carrier too many could turn out to be the 'straw' that broke the camel's back!

New Anixter-Mark Antennas

Inspite of a record snowfall and a test-yard area buried under hundreds of tons of snow, **Anixter-Mark** managed to get their new 5 meter and 3 meter TVRO antennas onto test stands during February and into a testing sequence.

The new three meter (10 foot) **antenna** has 12 metal petals and will be available sometime after mid-April with three separate feeds. Model ES40120W is a prime focus feed antenna (shown in photo). Model ES40120H is a prime focus feed with a horn for direct LNA mounting at the focal point. Model ES40120C is a Cassegrain type fed antenna. The mount on all three antennas, in the production models, is a three-point 'horizon to horizon' polar system. Price "range" for the new ten foot/3 meter antennas is around $2,200 list.

The "professional" model for CATV and other applications is a 5 meter, petal-metal, design. In the photo shown here a Cassegrain feed is employed. Delivery on this antenna is also expected to begin in April or early May.

Further information is available from Ed LeMarre at Anixter-Mark at 312-675-1500.

WTCG Tariff Reduced

Ed Taylor has announced a 'major reduction' in the charges for WTCG service via satellite; one he characterizes as **"saving SSS customers over two million dollars in the next three years."**

Because the WTCG via satellite now reaches into more than 2,000,000 homes Taylor has been able to reduce the **"maximum amount paid by any single cable system"** from $3,000 to $2,000. The reduced tariff will go into effect in mid-February, subject to FCC approval. Taylor also filed an additional

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TECHNICAL TOPICS

Earth Station Guidelines

"If you have or are building an earth station, caution must be used to insure you can obtain maximum continued use of the facility. Taking that thought apart for a moment, some truths become evident.

- **A.** Some earth stations are not cleared for all domestic satellites and/or are not cleared for all transponders.
- **B.** Fixed tune receivers have limited usage.
- **C.** Earth stations need not be used for video only.
- **D.** A separate receiver is only necessary for each **simultaneous** signal you wish to receive.
- **E.** More programming is available on Sat Com I than most Cable TV Systems can use due to duplication and limits in available channel space.

"Concerned as you are with the day to day problems of operating your CATV system, the decisions on which hardware should be purchased for the earth station have been traditionally placed with your engineering department. But is your engineering tech the person to make this type of decision? Can a technician be expected to make good decisions regarding your programming needs? Not only is the problem of what hardware to order difficult, if not impossible for your technician to ascertain accurately, but the manufacturers are not always ready to deal with the programming and earth station usage problem.

Example: After months of waiting, an MSO system manager's earth station arrived complete with three tuneable receivers at a cost of $6500 each. Three days of hard work and the station was functioning. The manager was then made aware that unless several thousand dollars was spent, only two signals could be transported over the existing trunk cable to the head end. Construction had to wait three months for warm weather.

"Stories like this are not uncommon and you may have one to tell yourself. Several of the reasons for these types of costly problems and errors are listed below.

- **A.** Management delegate hardware purchase responsibility to non-programming and non-cash flow oriented engineering staff.
- **B.** Equipment representatives understand their hardware but do not understand the programming possibilities and

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** CATJ is the leading technical magazine in the cable industry. . .WHY? Because it is published BY cable operators FOR cable operators!!!!
** CATJ is widely read in the United States and Canada and has subscribers in many foreign countries.
** CATJ was established to be the "how-to" manual for cable system operators and their technicians, and this philosophy has carried over through its years of existence.
** CATJ will continue to feature the newest in cable technology and to publish the best collection of wide ranging regular columns per month.

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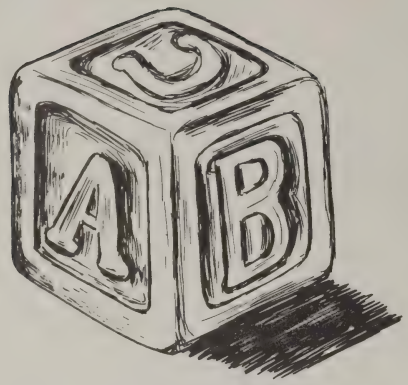

Very Elementary

What is more basic than 'gain'? Here is the idea 'shop-mate' for your CATV bench. . .a 117 VAC powered 30 dB "gain block" that produces input to output port hybrid chip gain that covers the range from 30 to 300 MHz (plus!).

The 'Gain Block' was developed in the CATJ Lab as a versatile kit project. No tuned circuits (very high quality Hewlett Packard 30 dB gain gold IC/hybrid on saphire substrate); no tuning, coils or adjustments! Gain extends below 30 MHz (25 dBg at 10 MHz) and up to 450 MHz (still 25 dBg).

All parts are supplied. The housing, regulated power supply (with output jacks to provide a bench-convenient emergency 15 VDC source), the special double-sided etched and drilled circuit board, all controls and components. **PLUS** - a handy manual that illustrates construction plus application of this handy amplifier.

* - **No-tuned-circuits** in the 30 dB "Gain Block" kit. Very high quality Hewlett Packard gold IC/hybrid device on saphire substrate. We guarantee 30 dB gain from 30 to 300 MHz (+ / − 0.5 dB) with no tuning, coils, or capacitors!
* - **Extremely linear** with +50 dBmV output capability at −57 dB cross mod for 12 channel (flat) input!
* - **Circuit board heat dissipation** - at full 30 dB gain rated input voltage of +15 vdc amplifier device runs at 35 degrees C, or less!
* - **High quality** input/output match (typically 20 dB RTL), and 7 dB noise figure at 100 MHz (slightly higher at 300 MHz).

THE PRICE is $105 but only as long as our initial supply of "good-buy" HP gold plate hybrid IC's lasts. When the initial stock is gone, the price of the "Gain Block" goes up to $145. So catch us early while this special introductory price is still good!

TVRO DEMOD KIT. . .this amazing phase lock loop video demodulator kit was developed by CATJ's Steve Birkill and first explained in the October 1978 issue of CATJ. This is the video demodulator that takes a very weak 70 MHz IF signal and turns it into a television picture with a minimum of effort. **PLUS** — it is probably the most sensitive video demodulator circuit available when you deal with below threshold TVRO signals. This is not recommended for big commercial installations, but for people who want to learn more about TVRO reception techniques this will fill the bill. **Price per kit** is $32. postpaid in USA and Canada.

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Decision Time!

The facts are in.

Satellite programming can be profitably marketed to your subscribers.

Now you must decide on the best method of acquiring a TVRO ground station.

You have two alternatives. Be your own system's engineer and install components purchased from individual manufacturers. This is not as complex as it sounds and can save you money.

Or you can purchase a complete turnkey package including site selection and installation from a TVRO system supplier.

But first you should be talking to people: other station owners with on-line systems; equipment and system suppliers; and most importantly with experts who have knowledge and experience in this field.

This is where Microdyne Corporation comes in. We are the largest single supplier of satellite receivers to the CATV industry. Our receivers are the standards against which all others are measured. As a result of this industrywide acceptance, our sales engineers have gained a level of experience unique to this dynamic market. We are in a position to provide a receiver or a complete turnkey installation. When you need information, it makes sense to talk to a leader.

MICRODYNE CORPORATION

P.O. Box 1527
627 Lofstrand Lane
Rockville, Maryland 20850
301/762-8500

Box 7213 • 491 Oak Road
Silver Springs Industrial Park
Ocala, Florida 32670
904/687-4633

how hardware must interface with these existing and future programming possibilities.

c. Earth station manufacturers have 'packages' that fail to offer a wide enough range of published options. Options needed are available but salespeople do not generally expose them to the prospective customer.

"I hope by now you are seriously wondering if the earth station and hardware selected for you is correct for your circumstances. To tell you that I have a standard solution would invalidate this entire treatise. Rather, I have provided a series of guidelines. These guidelines are for use by you, your engineer, and the person or persons responsible for marketing and programming. The guidelines are followed by my suggestion of six rules to be observed when building a **new** earth station.

Earth Station Evaluation Guidelines

1. How many audio and video signals can currently be transported from the earth station to your head end?
2. What equipment, at what cost for each audio and video signal, is needed to increase the number of signals which can be transported?
3. How many unused channels are currently available in your system?
4. How many parttime channels do you have or could you have by combining automated services?
5. Are there any plans to add channel capacity to your system?
6. What new programming will be carried with this planned additional capacity?
7. How many satellite receivers do you have now, counting any on order?

_____#Fixed Tune

_____#Tunable

8. Are any fixed tune receivers being used for parttime (less than 24 hrs.) programming?
9. Are any tunable receivers being used to receive more than one transponder?
10. List each type of receiver, transponder being received by each, and hours per day of usage.
11. Do any of your receivers have the capability to receive audio sub-carriers? What is the additional cost per receiver?
12. Do you have any unused audio channel space, i.e.; background on automated services or FM service?
13. Are any of the receivers capable of being remotely switched off and on, or being tuned to another transponder?
14. What are the limits of any automatic tuning and/or switching currently in use by your system?
15. How long would it take and what equipment would be necessary to move your antenna to another satellite?
16. How many services are currently available to you on Sat Com I? What are the hours of service, type of programming, and profit potential of each service?

"Completion of this exercise will take time for you and your staff, but the results will be quite revealing. It is imperative that as the answer to each question is determined it be written down. At this stage you may not be troubled by your answers. Great. You and your staff are to be congratulated for planning a modern video earth station. But are you ready for the non-video ancillary services? Your earth station is capable of receiving audio and video signals as it does now. But it is also **capable** of receiving high speed data, telephone, radio, and freeze frame TV. Subject to FCC clarification on the use of small diameter transmit antennas, frequency coordination, and possible antenna limitations, you may be capable of **transmitting** any or all of these services. This downlink and/or

uplink could be offered under a non-profit agreement or through a separate lease to a common carrier. The possible income production clearly means that any existing or planned earth station must be built with an eye toward full flexibility. In conclusion, let me state that in my opinion, satellite technology and programming opportunities are growing too rapidly for anyone to afford to be trapped with an inflexible earth station. This means that programming, cash flow, marketing, and engineering must be involved in the review of any earth station plans. As promised earlier, here are six basic rules which in light of the information received by this writer from manufacturers and programmers, should be carefully adhered to in the planning of any **new** earth station. Additionally, the preceding 16 questions should be used to determine what hardware should be ordered for the new facility.

Earth Station Building Rules

1. Coordinate the site for **all** frequencies and **all** domestic satellites.
2. Have preliminary check run to determine if the proposed site can be coordinated for up-linking.
3. Make provisions to transport at **least** two times the number of satellite signals you **currently** plan to use back to your head end.
4. Make all the provisions necessary to remote tune your receivers, even if you install only one fixed tune receiver.
5. If your earth station is not equipped for both polarities initially, be sure and order everything necessary except the LNA, so that in the future the conversion is quick and simple.
6. Allow sufficient space at your site for a second antenna.

"I am hopeful that this information proves useful to you and would appreciate any and all comments."

E.A. Eagan, Jr.
117A Brittany Farms Rd.
New Britain, CT 06053

ICBN Test Results

"I am pleased to enclose a summary of the end-to-end transmission test results for 145 mile Intercity Broadband Network (ICBN) coaxial cable trunk linking Winnipeg with Brandon. The attached table summarizes the major parameters as measured in November and early December. As was anticipated in my letter of September 13, 1978, we were able to maintain the 0.3 db. spread into Brandon during our system initial lineup.

"Sruki Switzer's concerns regarding K-factor and the cumulative effect of splices, amplifiers and other impedance discontinuities, have not materialized as is shown by the excellent baseband and R.F. parameter results.

"The end-to-end baseband distortions measured are essentially established by the originating modulator (Winnipeg) and test demodulator (back to back) combination and do not measurably degrade throughout the system.

"The gracious loan by Tektronix Canada Ltd. of a brand new model 1450 precision demodulator allowed us to compare measurements made using direct RF techniques (7L13 Spectrum Analyzer, Avantek CR-2000) with classical 'baseband' measurements. The agreement between techniques was surprisingly good; generally within 1.0 db.

"The stability and reliability of the system remain as unquantified parameters at present, with the passage of time and ongoing monitoring providing the forum for their definition. I suffice to say that our severe Manitoba climate (95°F in summer and -40°F in winter typically) will provide a very rugged test of these parameters.

"The system is presently carrying five television signals, ABC, NBC and PBS, plus two test channels and three FM broadcast signals, to Brandon. Application has already been made to the CRTC by the Brandon CATV

SUMMARY OF MAJOR ICBN BRANDON TEST RESULTS

System tested - Winnipeg to Brandon November 1978
System length - 145 cable miles (122 amplifiers)

(a) **RF Tests**

PARAMETER	MEASURED VALUE	NOTES
Carrier to Noise Ratio	53 db. minimum (CCIR weighted)	Tektronix 7L13 Spectrum Analyzer
Crossmodulation	– 66 db. maximum	8 channel loading-(7 ch. Synchronous 15750 Hz. Square wave mod. @ 100%) Per NCTA 002-0267
Hum modulation	– 51 db.	H.P. 8553 B/141T Spectrum Analyzer
Intermodulation	<– 80 db.	Tektronix 7L13 Spectrum Analyzer & Tracking Generator
Frequency Response	0.5 db. Peak to Valley (Spread)	Per Avantek CT/CR 2000 System

(b) **BASEBAND TESTS**

Made in accordance with IEEE Standard 511-1974 re "Video Signal Transmission Measurement of Linear Waveform Distortion" and Bell Canada Design Standard DS 8409 "Transmission Parameters of Video Baseband Signals".

PARAMETER	MEASURED VALUE	NOTES
Differential Phase	<1° *	Using Tektronix 1450 demodulator & 520 vectorscope
Differential Gain	2% max. *	Using Tektronix 1450 demodulator & 520 vectorscope
Chrominance Phase Non Linearity	2% max. *	Using Tektronix 1450 demodulator & 520 vectorscope
Chrominance Gain Non Linearity	<1% *	Using Tektronix 1450 demodulator & 520 vectorscope
Line Time Distortion	2% max. *	Using Tektronix 1480C Waveform Monitor
Pulse to Bar Ratio	3% max. *	Using Tektronix 1480C Waveform Monitor
2T Pulse Shape (K factor)	2% max. *	Using Tektronix 1480C Waveform Monitor
Luminance Non-Linearity	2% max. *	Using Tektronix 1480C Waveform Monitor

*Above Baseband test results identical to those obtained for modulator-demodulator pair alone. No degradation measurable on transmission system.

operator to add two additional television signals while additional FM signal carriage is also projected. Use of the system for carriage of telephony, using AM-SSBSC techniques is under active investigation, with the present inavailability of modems being a hindrance. Carriage of telephony on systems of this type using PCM techniques with standard FM CATV modems has been operational for some time in Canada. However, the PCM-FM technique does not represent optimum usage of bandwidth in what is a very linear transmission system.

"I have enclosed several prints from our "photographic library" on the ICBN. We are presently installing "loopback terminals" which will allow 300 and 450 mile transmission tests paths to be established. Comparative observation of the input and output signals from these tests may prove interesting.

"I hope these tests results and comments are of interest and serve to enhance the image of coaxial cable transmission technology.

W.E. Evans,
Broadcast Industry
Operations Manager
Manitoba Telephone System
Winnipeg, Manitoba
R3C 3V6

Readers with an interest in this extremely long coaxial cable distribution system technique should see CATJ for August 1978 (page 18) **and October 1978** (page 36).

What Guam Thinks

At the end of Ben Campbell's editorial in the March issue of CATJ, he asks what we think.

Here's what we think here:

1. We think CATJ is the finest technical publication in Cable TV.
2. We don't think Cable TV has any first order pressing technical problems.
3. We think Cable TV is going to get wiped out politically on copyright.
4. We think Valenti, Geller, Van Deerlin, and Kastenmeier are staunchly behind the movie industry's propaganda to increase copyright fees.
5. We think there are about 40 million Americans who watch Cable TV (19% of all American homes times our current population of 222 million people.)
6. We think that those 40 million Americans should know they are already paying twice for the same TV programs and are soon going to be asked to pay about 10 times more.
7. We think the 40 million Americans led by CATA and properly educated by all their Cable TV 'stations' could beat the seven fat cat movie studios who are the major copyright holders.
8. We think that all of these Satellite magazines and taped versions are just peachy keen, but while you are out there in the garage whittling model airplanes, Jack Valenti, the fox, is already in our hen house.
9. We think if the copyright law can be rewritten after being in effect for only one year it can be repealed for Cable.
10. We think if 80 percent of the CATA budget is being spent in Washington, then nobody else is doing anything."

GUAM CABLE TV
Lee M. Holmes
President

We agree with you on numbers 1, 3, 4, 5, 6, 7 and 9. Number 2 is open to debate; systems equipped with well trained personnel have no pressing problems but systems getting along with poorly trained and ill prepared personnel are having a tough time adjusting to all of this new technology. Sooner or later that starts to hurt. Number 8 says it all. Valenti made his 'deal' with NCTA's Schmidt in Dallas. Just a couple of years later, at NAB in Dallas this past March, he was on the rostrum proclaiming that the movie folks were going to expire unless they got their 'fair share'. Number 10 offers several possibilities, including spending 100% in Washington.

ASSOCIATE SHOWCASE

Oak Communications CATV Division has expanded its product lines with the introduction of seven units, they are,

(1) **"TotalControl" Converter/Decoder**

This addressable 35-channel/decoder, with a built-in "TotalControl" capability, allows operators using the "TotalControl" unit to offer multi-tier, premium programming that can add extra revenue from add-on subscriber demand for special shows. In the case of non-payment, tampering, or theft, operators can respond with automatic shut-off of the subscriber's service from the head end. The system is installed as a turnkey project, with on-going operator training, billing assistance, and routine maintenance provided by Oak personnel.

(2) **"TotalControl" VIDEOTEXT**

Data ranging from local retail prices to nationwide airline schedules can be programmed remotely from the system operator's head end for secure control of service through "TotalControl" VIDEOTEXT. The VIDEOTEXT format is a 24-row display of characters in the receiver's vertical blanking interval. Subscribers use selectors or full keyboards to request specific information, either business-related data such as stock quotations, or non-business data, such as traffic conditions and weather reports.

(3) **Moduline Series D-39**

A synthesized (digitally-tuned) 39-channel converter, the D-39 has two high-side injection oscillators, which are both crystal controlled from a common reference crystal. The first local oscillator is frequency synthesized, with the second local oscillator locked to the reference crystal via multiplier stages. This unique design approach makes the D-39 a highly stable converter. A triple-tuned trap at the output gives greatly reduced sperious outputs.

(4) **RL-35**

The RL-35 is a wired remote fine-tuning converter. Its detented rotary switch gives easy control of all 35 channels. It is also varactor-tuned, and offers better than 100 dB isolation against unwanted television stations that could cause direct pickup.

(5) **Econo-Line Thirty-Five**

This economically priced 35-channel varactor-tuned channel-by-channel converter features capabilities previously found in more expensive units. Smaller and sleeker than standard-size converters, it has a 35-position detent switch and is housed in a black ripple finish cabinet.

(6) **The Bloc**

Designed for the operator making his first move into extra channels, this unit is a fine-tuned mid-band block converter. It is a dual conversion converter, not requiring inverted carriers, and is, therefore, compatible with exising head end equipment. With a flip of the two-position switch, the subscriber receives up to seven extra channels. The 2-13 position delivers the standard 12 channels; the A-G mode converts on the output channels 7 through 13.

(7) **Second-Level Security Option**

This system, which gives operators extra control over service and equipment, consists of a converter/decoder equipped with a special electronic package. This package will only operate with a passive electronic device attached close to the tap outside a subscriber's home. This device will allow operation of more than one converter/decoder per drop. If a subscriber's drop cable is not equipped for pay operation and he attempts illegally to use an Oak converter/decoder with this dual security system, the decoder will not function. Thus, the system guarantees that only those subscribers who pay for programming will receive it.

For additional information on Oak Products, you will be able to visit them at their CCOS exhibit.

SHOWTIME DUAL TONE MULTIFUNCTION CONTROL TONES

SHOWTIME has announced it will expand its system of dual tone multifunction (DTMF) control tones, giving its affiliates the capability of automatically controlling various portions of the SHOWTIME feed on their systems. The four-digit tones can be used by systems for such purposes as automatically signing on or off the SHOWTIME feed; activating descramblers to open up selected satellite programming to all basic cable subscribers; blocking SHOWTIME advisories and signal tests from being seen by subscribers (for those systems that have primary access to the feed); and/or switching between the satellite feed and local access programming. Tones also bracket Front Row features, giving Front Row affiliates the capability of offering both SHOWTIME and the movie portion of Front Row service on the same channel.

The actual tones are similar to telephone Touch-Tones™ and have three digits and a non-numerical character. Tones at the beginning of a segment end with (*), and tones ending the segment end with (#) — the two non-numerical buttons on the Touch-Tone™ telephone.

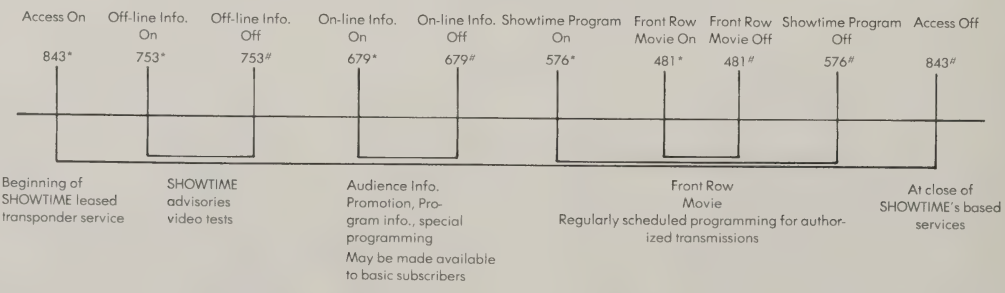
In order to utilize the tones, operators must acquire tone decoders which can be hooked up to the equipment necessary to provide the desired automation. The specific tones SHOWTIME is using are as follows:

1) Access Cut-in (843*) and Access Cut-out (843#).
   These tones will bracket all scheduled and unscheduled programming and advisories. The tones mark the daily start and end of SHOWTIME's leased transponder time, and would include any additional time being utilized in special situations.
2) Off-line Content Cut-in (753*) and Off-line Content Cut-out (753#).
   These tones will surround SHOWTIME's advisories, signal test, and any other information meant for affiliate's use only and not for SHOWTIME subscribers.
3) On-line Content Cut-in (679*) and On-line Content Cut-out (679#).
   These tones will bracket material transmitted prior to the programming day, which the operator may want to make available to all his basic cable subscribers. This may include program information, promotion, or special programming. SHOWTIME will use these tones during its national previews to enable systems to automatically access local programming for between-movie telethons.
4) SHOWTIME program Cut-in (576*) and SHOWTIME program Cut-out (576#).
   These tones will surround SHOWTIME's regularly scheduled programming.
5) Front Row Cut-in (481*) and Front Row Cut-out (481#).

ROSTER

AmeriCom Satellite Network, Inc., (A.S.N.), 310-14th Ave. South, St. Petersburg, FL 33701 **(S4)** 813—895-4201
Anixter-Pruzan, Inc., P.O. Box 88758, Tukwila Branch, Seattle, WA. 98188 **(D1)** 206—251-6760
Applied Data Research, Inc., Route 206 Center CN-8, Princeton, NJ 08540 **(M9)** 609—921-8550
Avantek, Inc., 3175 Bowers Avenue, Santa Clara, CA 95051 **(M8)** 408—249-0700
Belden Corp., Electronic Division, P.O. Box 1327, Richmond, IN 47374 **(M3)** 317—966-6661
B.E.I. (BESTON ELECTRONICS, INC.), P.O. Box 106A, Olathe, KS 66061 **(M9 Character Generators)** 913—764-1900
Bestvision Home Cinema, Inc., 5540 W. Glendale Ave., Suite C-106, Glendale, Az. 85301 **(S9 Pay-TV programming and marketing)** 602—931-9157
BLONDER-TONGUE LABORATORIES, One Jake Brown Rd., Old Bridge, N.J. 08857 **(M1, M2, M4, M5, M6, M7)** 201—679-4000
BROADBAND ENGINEERING, INC., 1525 Cypress Dr., Jupiter, FL 33458 **(D9, replacement parts)** 1-800-327-6690
Budco, Incorporated, P.O. Box 4593, Tulsa, OK 74120 **(D9 Security & Identification devices)** 918—584-1115
Cable TV Supply Company, 11505 West Jefferson Blvd., Culver City, CA 90230 **(D1, D2, D3, D4, D5, D6, D7, D8, M5, M6)** 213—390-8002
CCS HATFIELD/CATV DIV., 5707 W. Buckeye Rd., Phoenix, AZ. 85063 **(M3)** 201—272-3850
C-COR ELECTRONICS, Inc., 60 Decibel Rd., State College, PA 16801 **(M1, M4, M5, S1, S2, S8)** 814—238-2461
Century III Electronics, Inc., 3880 E. Eagle Drive, Anaheim, CA 92807 **(M1, M3, M4, M5, M7, M8, S1, S2, S8)** 630-3714
COLLINS COMMERCIAL TELECOMMUNICATIONS, MP-402-101, Dallas, TX 75207 **(M9, Microwave)** 214—690-5954
COMM/SCOPE COMPANY, Rt. 1, Box 199A, Catawba, NC 28609 **(M3)** 704—241-3142
COMMUNICATIONS EQUITY ASSOCIATES, 651 Lincoln Center, 5401 W. Kennedy Blvd., Tampa, FL 33609 **(S3)** 813—877-8844
COMPUTER VIDEO SYSTEMS, INC., Suite E, 6290 McDonough D., Norcross, GA 30093 **(M9)** 404—449-3800
Comsearch, Inc., 2936 Chain Bridge Rd., Oakton, VA 22124 **(S8, S9 earth station placement frequency coordination)** 703—281-5550
ComSoncis, Inc., P.O. Box 1106, Harrisonburg, VA 22801 **(M8, M9, S8, S9)** 703—434-5965
Comtech Data Corporation, 15207 N. 75th, Scottsdale, AZ 85260. **(M2, M6)** 602—991-9580
CRC ELECTRONICS, INC., 2669 Kilihau St., Honolulu, HI 96819 **(M9 Videotape Automation Equipment)** 808—668-1227
CWY Electronics, 405 N. Earl Ave., Lafayette, Ind. 47904 **(M9, D1)** 317—447-4617
Custom Building Products, Inc., P.O. Box 32231, Okla. City, OK 73132, **(S9, Underground Boring Equip.)** 405—495-1935
Daniels & Associates, 2930 E. 3rd Ave., Denver, Colo. 80206 **(S3, S9 Brokerage)** 303—321-7550
DAVCO, INC., P.O. Box 861, Batesville, AR 72501 **(D1, S1, S2, S8)** 501—793-3816
DF Countryman Co., 1821 University Ave., St. Paul, MN 55104 **(D1, S1, S8)** 612—645-9153
Durnell Engineering, Inc., Hwy. 4 So., Emmetsburg, Iowa 50536, **(M9)** 712—852-2611
EAGLE COM-TRONICS, INC., P.O. Box 93, Phoenix, NY 13135 **(M9 Pay TV Delivery Systems & Products)** 315—695-5406
EALES COMM. & ANTENNA SERV., 2904 N.W. 23rd, Oklahoma City, OK 73107 **(D1,2,3,4,5,6,7,S1,2,S7,8)** 405—946-3788
Entertainment and Sports Programming Network, 319 Cooke St., Plainville, CN 06062 **(S9)** 203—747-6847
FARINON ELECTRIC, 1691 Bayport, San Carlos, CA 94070 **(M9, S9)** 415—592-4120
FERGUSON COMMUNICATIONS CORP., P.O. Drawer 871, Henderson, TX 75652 **(S1, S2, S7, S8, S9)** 214—854-2405
Gardiner Communications Corp., 1980 S. Post Oak Rd., Suite 2040, Houston, TX 77056 **(M9 TVRO Packages, S1, S2, S8)** 713—961-7348
General Cable Corp., 1 Woodbridge Center, P.O. Box 700, Woodbridge, N.J. 07095 **(M3)** 201—636-5500
GILBERT ENGINEERING CO., P.O. Box 14149, Phoenix, AZ 85063 **(M7)** 602—272-6871
Harris Satellite Comm. Antenna Operations Division, P.O. Box 1277, Kilgore, TX 75662 **(M2, M9, S2)** 214—984-0555
Heller-Oak Communications Finance Corp., 105 W. Adams St., Chicago, IL 60603 **(S3)** 312—621-7661
HOME BOX OFFICE, INC., 7839 Churchill Way—Suite 133, Box 63, Dallas, TX 75251 **(S4)** 214—387-8557
HUGHES MICROWAVE COMMUNICATIONS PRODUCTS, 3060 W. Lomita Blvd., Torrance, CA 90505 **(M9)** 213—534-2146
IBM Corp., P.O. Box 2150, Atlanta, GA 30301 404—231-6005
Ind. Co. Cable TV Inc., P.O. Box 3799, Batesville, AR 72501 **(D1, S1, S2, S8)** 501—793-5872
International Microwave Corporation, 33 River Road, Cos Cob. CT 06807, **(M1, M4)** 203—661-6277
JERROLD Electronics Corp., P.O. Box 487, Byberry Rd. & PA. Turnpike, Hatboro, PA 19040. **(M1, M2, M4, M5, M6, M7, D3, D8, S1, S2, S3, S8)** 215—674-4800
JERRY CONN ASSOCIATES, INC., P.O. Box 444, Chambersburg, PA 17201 **(D3, D4, D5, D6, D7, D8)** 717—263-8258
Klungness Electronic Supply, P.O. Box 547, 107 Kent Street, Iron Mountain, MI 49801 **(D1, D8, S2, S8)** 906—774-1755

TYPICAL DAILY DTMF TONE SEQUENCING ON SHOWTIME



This chart represents a relative **sequence** of DTMF tones that will occur during a typical SHOWTIME day. The above chart does not necessarily correlate to real time.

LARSON ELECTRONICS, 311 S. Locust St., Denton, TX 76201 **(M9 Standby Power)** 817—387-0002
LRC Electronics, Inc., 901 South Ave., Horseheads, N.Y. 14845 **(M7)** 607—739-3844
Magnavox CATV Division, 133 West Seneca St., Manlius, N.Y. 13104 **(M1)** 315—682-9105
MICRODYNE CORPORATION, P.O. Box 1527, 627 Lofstrand La., Rockville, MD 20850 **(M9 Satellite TV Recs.)** 301—762-8500
MICROWAVE ASSOCIATES, INC., 777 S. Central Expwy., Suite 4-C, Richardson, TX 75080 **(M9 Microwave Radio Systems)** 816—891-8895
Microwave Filter Co., 6743 Kinne St., Box 103, E. Syracuse, N.Y. 10357 **(M5 Bandpass Filters)** 315—437-4529
MID STATE Communication, Inc., P.O. Box 203, Beech Grove, IN 46107 **(M8)** 317—787-9426
Modern Cable Programs Division of Modern Talking Picture Service, Inc., 2323 New Hyde Park Road, New Hyde Park, NY 11042 **(S4)** 516-437-6300
MSI TELEVISION, 4788 South State St., Salt Lake City, UT 84107 **(M9 Digital Video Equip.)** 801—262-8475
National Screen Service Corp., 1600 Broadway, New York, NY 10019 **(M9)** 212—246-5700
NORTHERN CATV DISTRIBUTORS, INC., 8016 Chatham Dr., Manlius, NY 13104 **(D1)** 315—682-2670
OAK INDUSTRIES INC./CATV DIV., Crystal Lake, IL 60014 **(M1, M9 Converters, S3)** 815—459-5000
PRODELIN, INC., 1350 Duane Avenue, Santa Clara, CA 95050 **(M2, M3, M7, S2)** 408—244-4720
Q-BIT Corporation, P.O. Box 2208, Melbourne, FL 32901 **(M4)** 305—727-1838
RMS CATV Division, 50 Antin Place, Bronx, NY 10462 **(M5, M7)** 212—892-1000
Sadelco, Inc., 299 Park Avenue, Weehawken, NJ 07087 **(M8)** 201—866-0912
SATCO, P.O. Box 1260, Lewisville, TX 75067 **(M4)** 214—436-9509
Scientific Atlanta Inc., 3845 Pleasantdale Rd., Atlanta, GA 30340 **(M1, M2, M4, M8, S1, S2, S3, S8)** 404—449-2000
SCIENTIFIC COMMUNICATIONS, INC., 3425 Kingsley Rd., Garland, TX 75041 **(M4 Low Noise & Parametric)** 214—271-3685
Showtime Entertainment, Inc., 1211 Ave. of the Americas, New York, NY 10036 **(S4)** 212—575-5175
Southern Satellite Systems, Inc., P.O. Box 45684, Tulsa, OK 74145 **(S9)** 918—664-4812
Systems Wire and Cable, Inc., P.O. Box 21007, Phoenix, AZ 85036 **(M3)** 602—268-8744
T.E.S.T., Inc., 16130 Stagg St., Van Nuys, CA 91409 **(M9 Encoders & Decoders)** 213—989-4535
TEXSCAN Corp., 2446 N. Shadeland Ave., Indianapolis, IN 46219 **(M8 Bandpass Filters)** 317—357-8781
The Associated Press, 50 Rockefeller Plaza, New York, NY 10020 **(S9 Automated News SVC)** 212—262-4014
Theta-Com CATV, Division of Texscan Corporation, 2960 Grand Avenue, Phoenix, AZ 85061, **(M1, M4, M5, M7, M8)** 602—252-5021
TIMES WIRE & CABLE CO., 358 Hall Avenue, Wallingford, CT 06492 **(M3)** 203—265-2361
Tocom, Inc., P.O. Box 47066, Dallas, TX 75247 **(M1, M4, M5, Converters)** 214—438-7691
TOMCO COMMUNICATIONS, INC., 1077 Independence Ave., Mtn. View, CA 94043 **(M4, M5, M9)** 415—969-3042
Toner Cable Equipment, Inc., 969 Horsham Rd., Horsham PA 19044 **(D2, D3, D4, D5, D6, D7)** 215—675-2053
Trenco Inc., P.O. Box N, 385 South 300 West, Salem, UT 84653 **(S1, S2, S7, S8, S9 Consulting)** 801—798-8633
Triple Crown Electronics Inc., 42 Racine Rd., Rexdale, Ontario, Canada M9W2Z3 **(M4, M8)** 416—743-1481
TURNER COMMUNICATIONS CORP., (WTCG-TV), 1018 West Peachtree St., Atlanta, GA 30309 **(S9)** 404—875-7317
UNITED PRESS INTERNATIONAL, 220 East 42nd St., New York, NY 10017, **(S9 Automated News Svc.)** 212—682-0400
UNITES STATES TOWER & FAB. CO., P.O. Drawer "S", Afton, OK 74331 **(M2, M9)** 918—257-4257
United Video, Inc., 5200 S. Harvard, Suite 4-D, Tulsa, OK 74135 **(S9)** 918—749-8811
Van Ladder, Inc., P.O. 709, Spencer, Iowa 51301 **(M9, Automated Ladder Equipment)** 712—262-5810
VIDEO DATA SYSTEMS, 40 Oser Avenue, Hauppauge, NY 11787 **(M9)** 516—231-4400
VITEK ELECTRONICS, INC., 4 Gladys Court, Edison, NJ 08817 201—287-3200
WAVETEK Indiana, 66 N. First Ave., Beech Grove, IN 46107 **(M8)** 317—783-3221
WEATHERSCAN, Loop 132, Throckmorton Hwy., Olney, TX 76374 **(D9, Sony Equip. Dist., M9 Weather Channel Displays)** 817—564-5688
Western Communication Service, Box 347, San Angelo, TX 76901 **(M2, Towers)** 915—655-6262/653-3363
Winegard Company, 3000 Kirkwood Street, Burlington, Iowa 52601 **(M2, M3, M4, M5, M7)** 319—753-0121

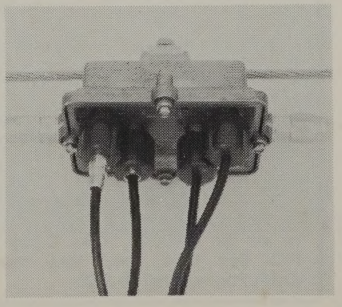
These tones bracket the Front Row features. They can be used to activate a descrambler for Front Row subscribers, in a system where SHOWTIME and Front Row are offered on the same channel. This option enables systems desiring a two-tiered service, but having only one available channel, to offer both Front Row and SHOWTIME.

In an effort to control unauthorized use of signals and with the issues of copyright infringement, it is very important for cable systems using satellite services to shut off the feed during its service's non-leased time periods. Operators can unknowingly broadcast television programs, sports events, network news feeds, and even private closed-circuit transmissions to their subscribers, making them open to the possibility of lawsuits. Automatic sign-on and sign-off tone switching can facilitate accurate control of satellite signal reception. SHOWTIME has taken the tone switching one step further to build more flexibility into their systems as they can improve their on-air look, create a new source of on-air promotion, and simplify the use of locally originated telethons during previews.

NEW PRODUCT RELEASE

C.W.Y. Electronics announces the availability of a new lock for a common "F" fitting. Dubbed the Label-Lock, the device performs a lable and locking function for the prevention of theft of service and labeling the condition of applied "F" fitting. Security is accomplished by installing the Label-Lock upon a "F" fitting whereupon it must be destroyed to be removed. Ten distinct colors are available for tagging the condition.

Terry French of C.W.Y. Electronics will have a booth at CCOS-79 and you'll have an opportunity to examine these.



Continued From Page 46

There could be many reasons, business was extremely good during the past year and projections are better than ever, which means each attendee had predetermined what suppliers he intended to visit and had pre-planned his business. These negotiations take a certain amount of time, and that left little time to "browse".

Let me say now—the NCTA is a **large** show. There were more than 200 exhibits to be seen. Many companies were exhibiting for the first time. It took a long time just to walk past the inside displays, let alone visit the outside earth stations.

There were also many other influences operating on attendees in a town which never closes. There were a large number of very good technical and business sessions to attend, as well as the exhibits. And in the evening, what a smorgasboard of entertainment!! There were the traditional hospitality suites in the convention hotel, the Las Vegas Hilton. HBO treated the group to Paul Anka and a taping session of the Rich Little Special (to be aired in July). Then finally there was Las Vegas itself with the roulette wheels, shows, black jack tables, craps, restaurants, and the omni-present slot machines.

From this vendor's point of view and from others that I have talked to, this show was a very good one, and it can only mean that the health of our industry at the present is excellent and thriving. New products and services that were seen at the NCTA will be featured and discussed later in CATJ so you can look for some of these features. There's a lot of new technology and sophistication of old, so there are plenty of things for cable operators to consider. Delivery on some items are still a problem; others not so much so, but things are definitely on the move and you could feel this spirit inside the Exhibit Hall. . .sure felt good too!!

The Double Eagle System

Positive and Negative Trapping for Double Security

Security As Good As Gold

Now there is a way to scramble both video and audio and double your security, too! The Double Eagle System combines the effectiveness of both the Eagle 2-DF Positive Descrambler and 2-NF Negative Trap to create the two-tiered security you need.

Cost Effective, Profitably Efficient

Combine the low cost of the Double Eagle System with the increased revenues it will create and you have doubled the reasons to give us a call. We would like to tell you how the Double Eagle System can be as good as gold for you.

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7841 West River Road, Baldwinsville, New York 13027
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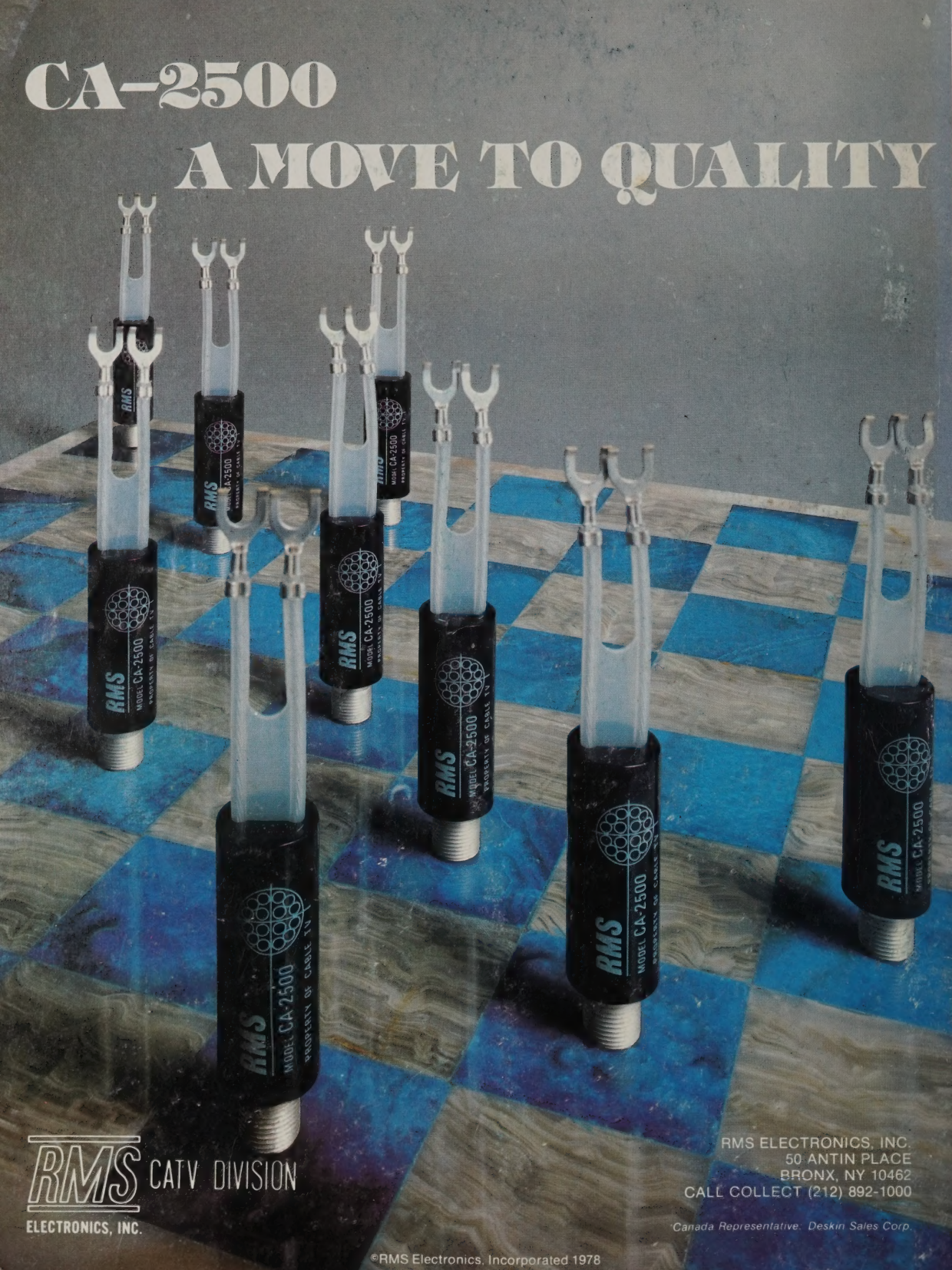

RMS ELECTRONICS, INC.
50 ANTIN PLACE
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CALL COLLECT (212) 892-1000

Canada Representative: Deskin Sales Corp.

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